AUTOMOTIVE INDUSTRIES

Vol. 71, No. 4 ▫ THIRTY-SIXTH YEAR ▫ July 28, 1934

Estimate July Total 260,000

Deliveries 8% Under June; Predict Heavy August Cuts

by Athel F. Denham
Detroit Editor, Automotive Industries

DETROIT—Indications the past week point to a healthy cut in automobile production rates during August giving dealers a better chance of disposing of car stocks prior to introduction of new models. Some reductions as a matter of fact have already been made in production schedules, but these are mainly in line with normal seasonal decline in sales since mid-month.

Indications at present are that July should show a final total of around 260,000 cars and trucks although much depends on schedules for the closing week of the month. August, it is estimated at present, should not exceed 220,000.

Domestic retail deliveries, passenger cars and trucks for the month of July should run about 8 per cent under June totals when complete returns are in. For the first half of the month, however, sales were close to the June level, being not more than two or three per cent behind June for the major producers.

Plymouth in week ending June 21 passed its production total for all of 1933. It is possible that Plymouth's total for the current year may run close to 350,000 cars.

Buick in the first 20 days of June delivered 5,507 cars compared with 5,139 the same period in June.

(*Turn to page* 102, *please*)

M. E. Coyle
Chevrolet general manager, whose company has been charged with code violation

General Motors' cash account for the first half of the current year shows cash, United States Government and other marketable securities at June 30, 1934, amounted to $201,713,115, compared with $177,303,966 at December 31, 1933, and $200,488,763 at June 30, 1933. Net working capital at June 30, 1934, amounted to $301,817,504, compared with $243,832,896 at December 31, 1933, and $259,499,831 at June 30, 1933.

Ford to Exhibit

NEW YORK—It is reported as more than a possibility that Ford will exhibit in the 1935 New York and Chicago shows, now that they are to be operated by local dealer organizations of which the Ford Co. is a member.

GM First Half Earnings Increase 50¢ Per Share

NEW YORK—For the six months ended June 30 General Motors earned $1.51 per common share comparing with $1.01 per common share for the same period of 1933, or an increase of 50 cents per share of common stock.

According to the General Motors report issued Thursday by Alfred P. Sloan, the net earnings of the corporation for the first half of this year after deducting dividends were $64,997,503 against $43,478,441 for the first six months of last year. This represents an approximate gain of $17,000,000.

Seek Injunction Against G.M.; Charge Chevrolet Violated Code

NEW YORK—Injunction proceedings, based on the Shackno Act, New York State's own NRA law, have been begun against General Motors Corp., Chevrolet Motor Co. and Chevrolet Motor Co. of New York to restrain the defendants from alleged violation of the Motor Vehicle Retailing Code. The plaintiff is the Payne Motor Co.

The suit was started Wednesday before Justice Hofstadter in the New York Supreme Court. Justice Hofstadter is reported to have signed an order directing the defendants in the action to show cause not later than today (Saturday, July 28) why they should not be so enjoined.

The plaintiff charges General Motors, Chevrolet Motor Co., and Chevrolet Motor Co. of New York, as principal or agent, at the invitation of the City of New York had offered to sell the municipality about 50 vehicles below the prices set in the code for new cars. The code provides that no new car shall be offered at retail sale at a discount.

It is reported that the metropolitan code administration, while not a party to the suit, is lending its moral support and backing to the action. Commissioner Hulett is reported to have stated that the cause of the present proceedings arose from the alleged action on the part of Chevrolet of underbidding Chevrolet dealers' cost price to get the New York City fleet business. Mr. Hulett, it is understood, believes this is a direct violation of code provisions and therefore liable to civil action.

New NRA Policies Cover Work Hours, Customer Grouping, Material Costs

WASHINGTON—The National Recovery Administration has announced three new policies—provisions to be made for greater flexibility in averaging work hours, classification of customers and definition of cost of materials. It was stated by NRA officials that application of these new policies to already approved codes is not to be arbitrary and need not be expected unless the impracticability of inconsistent code provisions has been demonstrated. Relative to codes awaiting approval, if otherwise acceptable, they will be approved and only the glaringly inconsistent provisions will be stayed until the affected industry has had an opportunity to show the necessity for a variation from the now established policy.

The automotive industry will not be affected by the new policy covering averaging of work hours. When the Automobile Manufacturing Industry Code was submitted and approved provisions were written into it covering this matter. The vagaries of the industry were considered when the 35-hour week clause was written and provision was made for allowing a tolerance of 13 hours in any one week at peak seasons, so long as the average did not exceed 35 hours per week during the life of the code.

At the same time these provisions were inserted certain exemptions also were allowed for those employees engaged in the preparation, care and maintenance of plant machinery and production facilities. These employees may work 42 hours per week on an annual basis.

The A.P.E.M. code provides for a work week of 40 hours averaged over a six months' period, but allows a tolerance of 8 hours per week to provide for peak periods and labor shortages. However, this tolerance must be absorbed in the general average. Employees engaged in preparation, care and plant maintenance are exempt from the weekly limitation already stated and may work 42 hours per week.

(*Turn to page* 102, *please*)

Chevrolet's Freight Bill $20,000,000 in 6 Months

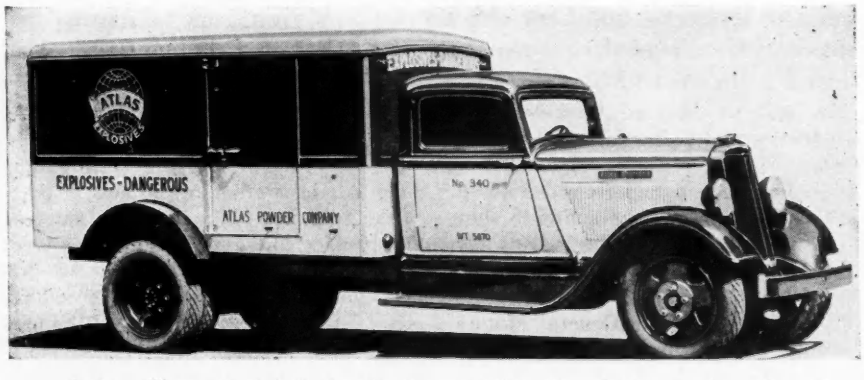
DETROIT—The country's transportation systems collected more than $20,000,000 in freight revenues from a single unit of the motor car industry in the first half of 1934, according to a summary of freight tonnage issued by the Chevrolet Motor Company.

Chevrolet's plants received and dispatched 2,111,798 tons of raw material, manufactured units, and complete cars and trucks up to July, it is revealed. More than 96,970 freight cars were used; tonnage moved by other means, including trucking and boat lines, would have filled 63,528 additional freight cars. More than 350 railroad lines shared in the revenue.

New British Automobile Tax £4, 10s. Up to 6 hp.

WASHINGTON — According to Assistant Trade Commissioner Henry E. Stebbins reporting to the Department of Commerce from London, the minimum rate of taxation on automobiles (not yet passed) in England will be £4 10s. per annum on vehicles not exceeding 6 hp. On vehicles exceeding 6 hp. the tax will be 15s. for each unit or part of a unit of hp.

Mr. Stebbins reports that the Parliamentary Secretary has stated to the Minister of Transport in the House of Commons that the reduced hp. tax will not apply on three wheeled vehicles not exceeding eight hundredweight in weight unladen.



Dodge 1½-ton truck built for the transportation of explosives to the order of the Atlas Powder Co. of Wilmington, Del. The body frame is covered with a sheathing of 5/16-in. pine slats, over which is placed a layer of ¼-in. asbestos, and the superstructure is finally covered with 20-gage auto-body stretcher-leveled sheet metal

Plans Development of Safer Flying Equipment

WASHINGTON—The organization of a Development Section within the Bureau of Air Commerce, Department of Commerce, has been announced by Eugene L. Vidal, director of the bureau. John H. Geisse, chief of the manufacturing inspection service, will head the new section.

The principal object of the new section which will be financed from the $1,000,000 fund appropriated by Congress for aviation development, is to foster the development of safer flying equipment, especially for private use.

Canadian Sales Show Economic Improvement

Quebec Province Reports Big Gains in Passenger Car Transactions in May

QUEBEC—Evidence of the increase in purchasing power of the Canadian public during recent months is contained in passenger automobile sales figures for May, 1934, in the province of Quebec.

During that month 1924 passenger automobiles of 12 leading Canadian makes were sold in Quebec Province compared with 1108 in May, 1933. Total sales in the province of the same makes for the first five months of 1934 were 4318, compared with 3134 for the corresponding period of 1933, an increase of nearly 34 per cent.

Canadian automobiles and automotive parts are being shipped in large quantities at the present time from Montreal, principally to various parts of the British Empire. Exports of automobiles, including trucks, from Canada during the first quarter of 1934 totaled 9430 units, valued at $4,091,301. These shipments included over four times as many motor cars and trucks as were exported in the corresponding period of 1923, when 2333 motor vehicles valued at $1,141,272 were shipped abroad. The great bulk of these Canadian shipments, it is pointed out, were destined to Empire countries.

Recently heavy shipments of automobiles have been noted from Montreal to British South Africa, according to the report. More than 1500 were exported to that market on two chartered vessels sailing from Montreal in the first two weeks of the current month. During the first quarter of 1934, 1969 cars were shipped from Canada to South Africa, as compared with only 105 cars in the first three months of 1933.

Propose Amendments To SAE Constitution

No Immediate Changes Contemplated; Votes Must Be In August 20

NEW YORK — Members of S.A.E. have received ballots for recording their votes on proposed amendments to the society's constitution covering initiation fees and annual dues. According to John A. C. Warner, secretary, the presentation of the amendments contemplate no immediate change in the various fees, yet it was felt the amendments would facilitate making of adjustments that might be necessitated by any major fluctuation in the nation's currency. Ballots must be in before August 20.

Section C20 of the present constitution provides for initiation fees of $25 for members; associate, $25; Junior, $10; service member, $10; foreign member, $10; departmental member, $100, and affiliate member, $50. The proposed amendment to this section is as follows:

C20—The Council may, at its discretion, by a three-fourths ballot vote of its duly elected members, change any then existing schedule of initiation fees for membership in the various grades. No increase in fees shall be effective until after two months' notice by publication in the Journal of the Society, or by letter to the membership.

Section C21 covers the annual dues, which are: members, $20; associate, $20; Junior, $10; service member, $15; foreign member, $15; departmental member, none; each affiliate member, $20. The proposed amendment follows:

C21—The Council may, at its discretion, by a three-fourths ballot vote of its duly elected members, change any then existing schedule of dues for membership in the various grades, and may provide for the payment of dues for periods of three, six or twelve months. No increase in dues shall be effective unless announced by publication in the Journal of the Society, or by letter to the membership, at least one month prior to the beginning of the period in which the increase is to be first effective.

Weinhardt, Engine Designer, Joins Reo

LANSING—Ray J. Fitness, chief engineer of the Reo Motor Car Co., has announced the appointment of R. A. Weinhardt as assistant chief engineer of both passenger car and truck divisions.

Mr. Weinhardt entered the automobile field as chief engineer of the Nevada Motor Car Co., builders of mining transport trucks for use on the deserts of Nevada. Later he was for several years assistant chief engineer of Continental Motors Corp., where during the war period he created the military truck engines.

R. A. Weinhardt

In 1924 Mr. Weinhardt joined the Packard engineering staff, being later appointed chassis engineer. While with Packard he designed the series of engines used in recent years in Gar Wood's "Miss America" hydroplanes in the Harmsworth Trophy races and in setting world's speed records for boats.

GM Acceptance Corp.

NEW YORK—The balance sheet of the General Motors Acceptance Corp. as of June 30 listed assets including cash, $34,178,435; notes and bills receivable (U. S. and Canada), $235,781,545, and (overseas) $19,518,339. The cash assets show an increase of approximately $5,000,000 over the same date of 1933, which were $29,320,871. Liabilities including notes and bills payable (U. S. and Canada), $157,057,407, and (overseas) $11,315,360.

Tire, Battery Trade Tolerance Set At 10%

Say 15% Rule Caused Destructive Cutting; Steel Still Chary

WASHINGTON—NRA Administrator Johnson has ordered that the tolerance of 15 per cent below prices filed with code authorities in connection with Government bids shall be reduced to 10 per cent in the case of the retail tire and battery industry. General Johnson, in his order lowering the tolerance, finds that the larger amount is resulting in destructive price cutting.

However, this action is not looked upon as setting a precedent, for in effect it simply restored the tolerance ordered by the Administrator on tire and tube prices June 28, the day prior to the issuance of President Roosevelt's order allowing the tolerance. The NRA legal division has interpreted the Presidential order, where applicable at all, to be applicable only to bids on local, State and Federal Government business. This is substantially the same ruling made for the steel code. In the steel ruling it was held that the prices submitted on Government business simply had to be filed with the code authorities "for information only," and therefore does not affect the base prices already filed.

Nevertheless, the order remains a source of considerable concern to the steel industry, and that industry is of the opinion that, despite NRA rulings, the prices submitted by members on Government business if lower than those on file, will be insisted upon by buyers generally and consequently bring down the whole price structure.

First Half Production Figures For U. S. And Canada Gain 700,000 Over 1933

WASHINGTON—Production of motor vehicles in the United States and Canada for the first half of 1934 amounted to 1,796,409 units as compared with 1,028,376 for the first six months of 1933, according to reports just released by the Census Bureau. This represents an increase of 75 per cent over the same period a year ago. Of these motor vehicles 1,467,788 were passenger cars and 328,621 were trucks. The passenger cars show an increase over the first half of last year of about 69 per cent, while for the same period trucks show an increase of 105 per cent.

June production of passenger cars and trucks in the United States and Canada amounted to 321,956 as compared with 257,050 during June of last year and 351,853 during May, 1934, showing a drop from May of about 8 per cent, but an increase over June, 1933, of approximately 25 per cent.

Passenger car output during June amounted to 272,662, as compared with 290,269 in May and 213,602 during June, 1933. Truck output dropped from 61,544 in May to 49,294 in June.

Detailed comparisons are given in the following table:

Production—U. S. and Canada

	Passenger Cars	Trucks	Total Motor Vehicles
June, 1934...	272,662	49,294	321,956
May, 1934...	290,269	61,544	351,813
June, 1933...	213,602	43,448	257,050
6 Mos., 1934	1,467,788	328,621	1,796,409
6 Mos., 1933	868,292	160,084	1,028,376

Kuhn, Loeb-Lehman Brothers Reported Planning Studebaker Reorganization

NEW YORK—Revelation of Kuhn, Loeb & Co. and Lehman Brothers as the New York banking houses interested in a plan of reorganization of Studebaker Corp., was not as surprising to those in informed circles as might be supposed. Arthur Lehman, a partner in the Lehman firm, is a Studebaker director, and it was not surprising when this firm's name was linked in unconfirmed rumors with reorganization plans. However, the entry of Kuhn, Loeb into the picture was not exactly expected, yet this house and Lehman Brothers have been closely identified in the past with similar ventures.

While no official confirmation is available at the moment, it is understood that the mid-western banking organization interested with the New York group is Fielding, Glore, a Chicago concern.

Members of the New York houses have refused to comment upon the details of the plan which has been proposed to the Studebaker creditors. But it was stated that representatives of the firms have already placed before the heads of the three creditor groups the outline of the plan and that tentative approval has been given. It is understood that the plan contemplates the segregation of the White Motor Co. stock, now controlled by Studebaker, and the obtaining of new security through the sale of securities. Representatives of the three creditor groups, securities holders, merchandise creditors and banks holding Studebaker paper, are relaying this plan to the creditors. Before any definite action can be taken, of course approval of the plan must be given by the creditors. After this approval has been secured it will then be necessary to present the plan to the Federal Court at South Bend. The court's approval is necessary under the new Federal bankruptcy act.

According to M. T. Moore of the law firm of Cravath, DeGersdorff, Swaine & Wood, if creditors approve the plan, Studebaker will be reorganized under Section 77 of the Bankruptcy Act.

The plan, which it is understood has been formulated by the bankers is reported to have been confirmed by Paul G. Hoffman and Harold S. Vance of Studebaker, who, along with A. G. Beane, White president, are the Studebaker receivers. It has been known for some time, though not confirmed, that consideration has been given to a plan to divorce the White company and Studebaker and that American Car and Foundry had opened negotiations with Studebaker for the purchase of the approximate 95 per cent of the White interests now held by the South Bend organization.

Walter E. Edge, former U. S. senator from New Jersey and one-time ambassador to France, is chairman of a noteholders' committee which represents a large portion of the Studebaker noteholders. Mr. Edge is reported to be quite active in discussions of the reorganization plan. At present estimated claims against the company aggregate about $21,300,000. They consist of $14,861,000 principal amount six per cent notes, about $3,600,000 in unsecured loans and about $2,000,000 in trade accounts payable.

In *Automotive Industries* on April 14 it was reported that the receivers' statement showed Studebaker had made a profit of $54,619 on operations after deducting $79,849 for expenses, replacements and depreciation, and crediting $63,328 interest received. More recently it has been reported in these columns that Studebaker's sales have shown a steady increase with the introduction of new body models. . . . In general the period of the receivership has shown substantial gains over previous years.

Automotive Exports Decline 3% In May

Ship 15,922 Passenger Cars; Bus, Heavy Truck Chassis Gain Over April

Total exports of automotive products during the month of May reached a valuation of $21,295,707, a falling-off of but 3 per cent from the April figure of $21,974,167, and an increase of 175 per cent as compared with the shipments recorded in May, 1933, amounting to $7,728,002, according to the Department of Commerce. The export total in this commodity group for the Jan.-May period was $89,256,239, which already exceeds the figure of $82,185,100 for the entire year of 1932, and is but 4¾ million dollars less than the year's total for 1933.

Passenger car exports numbered 15,922 units valued at $8,881,744 as against 16,378 units valued at $8,721,534 in April. Shipments of cars in the low price range were reduced both in number and value, but each of the three higher priced classes showed improvement. Cars in the class "over $2,000" accounted for 92 units worth $250,354, as compared with 55 units valued at $134,098 in April. The Union of South Africa, Belgium, Japan, Sweden, and the United Kindom represented the chief markets for American passenger cars during the month under review, with South Africa, Japan and the United Kingdom recording higher valuations than in April.

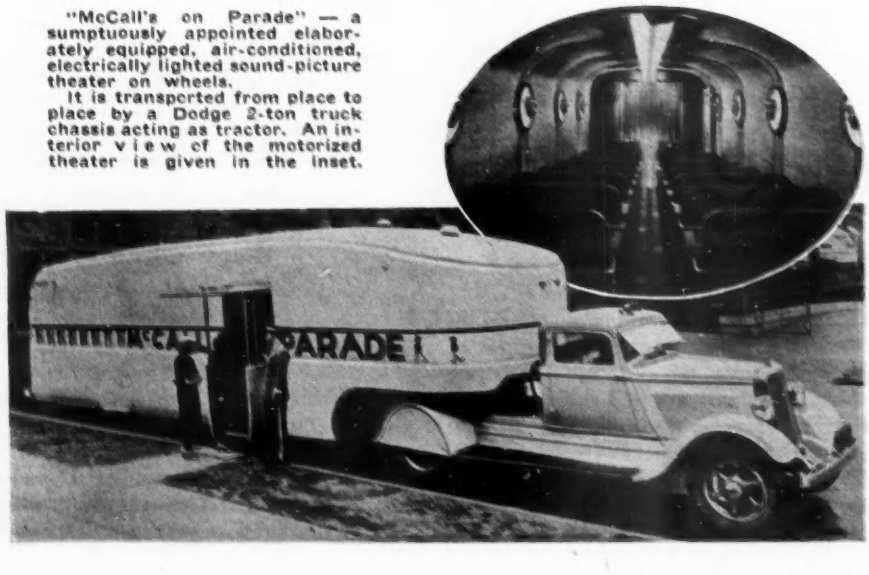
Shipments of commercial vehicles were generally off, trucks "over 2½ tons" and bus chassis being the only two classifications in this group to show an increase over April. Spain, Japan, Belgium, Union of South Africa, Denmark, British India, Argentina, and Australia were the leading countries of destination for trucks and buses in the order given. Due to shipments in the higher priced groups, the average export valuation of passenger cars and trucks increased to $558 and $475, respectively, as compared with $532 and $453 in April.

Exports of miscellaneous automotive products amounted to $8,355,347 as against $8,386,738 in April and $4,105,708 during May of last year. The following figures show the valuation of shipments to our foreign markets for the current month, with the April totals in parentheses: Automobile engines, $305,229 ($388,276); parts for assembly, $4,801,352 ($4,831,620); parts for replacement, $2,185,651 ($2,273,700); brake lining, $84,199 ($72,086); accessories $315,352 ($305,128); service appliances $237,108 ($171,706).

Land-Going "Show-Boat"

"McCall's on Parade" — a sumptuously appointed elaborately equipped, air-conditioned, electrically lighted sound-picture theater on wheels.

It is transported from place to place by a Dodge 2-ton truck chassis acting as tractor. An interior view of the motorized theater is given in the inset.



Steel Market Leans On Automotive Orders

Car Makers' Requirements Enable Flat Producers to Step Up Operations

NEW YORK, July 26—The steel industry continues to lean heavily on automotive demand for support of the prevailing operating rate, which for the current week is placed by the American Iron and Steel Institute at 27.7 per cent of capacity, compared with 28.8 per cent during the preceding week. Flat steel producers, however, appear to have been enabled through somewhat better specifications from motor car manufacturers and parts makers to step up their operating rate.

Mahoning Valley rolling mills are working at close to 30 per cent of capacity, with automotive flat steel specialists, such as those in the Michigan district, doing considerably better, though by no means back to the average June rate.

Prominent automotive consumers are not permitting their opinions on whether what now, following the most recent price revision, amounts to a $3 per ton advance in sheet prices over those in effect for the second quarter was or was not justified, to interfere with the orderly covering of their nearby needs. They have contracted for what steel they will need in August. Some of the smaller buyers, however, cling to the belief that before long the steel market will turn more in their favor, and, therefore, they are not committing themselves for a single ton more at present prices than they absolutely have to.

R. K. White who has joined the Campbell-Ewald Company. He will contact the Pontiac Motor Car Company account.

So far there is little indication that any of the outlets for steel aside from the automotive industries, is attaining anything like volume proportions, and until a much stronger demand develops from other consuming industries, especially the building and transportation industries, the attitude of automotive buyers will be the paramount market influence.

Pig Iron—Single carload business continues to be the predominant activity in most of the pig iron markets. Most of the automotive foundries are fairly well stocked. Interest in forward contracts is light.

Aluminum—The leading domestic producer is gradually working lower a heavy surplus which accumulated when demand was light and production was continued on an even keel in order to provide employment. Quotably the market is unchanged.

Dealers Argue Code Changes Before NRA

Amendments Would Cover Fleet Rebate, Liquidated Damages and Consignments

WASHINGTON—At a meeting this week of the Emergency National Committee, called for the purpose of discussing with NRA certain changes in the Motor Vehicle Retailing Code which dealers feel will make the application and enforcement of their code more effective, three principal changes were discussed. They were fleet discounts, assessing of liquidated damages and consignment provisions.

Divisional Administrator Adams, after hearing the arguments of the dealer representatives on these points, instructed them to proceed with the development of the proposed amendments covering the points in controversy. When they are in completed form and presented to him, Mr. Adams said he would rule whether or not these proposed amendments must be submitted to criticism at public hearing.

In the case of the consignment provision of the retailing code, dealers expressed their opposition to the present ruling—that it is not a code violation for a dealer to take a car on consignment from an owner for purposes of resale at a price higher than stipulated in the N.A.D.A.'s official used car guide. The dealers contend this ruling permits wholesale violation of the code with full legal protection.

In their discussion of the clause covering assessing of liquidated damages dealers informed NRA it was their belief that they should be in a position to assess fines against violators of this clause which, if the alleged violator agreed to an assessment, would not aggregate a sum greater than twice the gross profit on the new car involved in the transaction.

In the matter of fleet discounts a delegation of truck manufacturers presented the argument that they should be relieved from this provision inasmuch as they were not consulted when the arrangements in the provision were made.

At the same time public hearings were held on the retail code budget, which for the whole country aggregates approximately $2,400,000. Each state in the union was called upon and examined in order to legalize each individual state budget.

It was announced that Jo. G. Roberts, former Nash distributor in Philadelphia, had been appointed Deputy Administrator in charge of all automotive codes. Mr. Roberts entered the automobile business as a Buick dealer in 1907. During 1910 he joined GM as a traveling man and in 1912 took charge of the Chicago Buick branch office.

When Charles Nash left GM in 1917, Mr. Roberts followed him and was named manager of the Chicago branch of Nash. He remained in this office until 1920 when he became a Nash distributor, remaining in this capacity until 1934. From 1922 to 1923 Mr. Roberts was a director of N.A.D.A.

New Car Registrations Increase 53% In First Six Months of Current Year

PHILADELPHIA—New motor vehicle registrations for the first six months of 1934 amounted to approximately 1,189,000 units as compared with 775,478 for the first six months of 1933, representing a gain of about 53 per cent. Of this number 995,479 were passenger cars as compared with 682,367 for the same period of last year, while trucks totaled 193,976 as against 93,111 for the first half of 1933. New truck registrations have shown a very substantial increase of approximately 108 per cent, for the first half of this year, and passenger cars of about 46 per cent for the same period.

The above data is based on an estimate for June registrations of passenger cars and trucks, which was computed on returns from 34 states. Based on these partial returns new car registrations for June amounted to 224,000 units as compared with 174,190 a year ago and 219,163 during May of this year. This shows a reversal of the seasonal trend, as it represents about a 2 per cent gain over May whereas the seasonal trend is downward for June as compared with May.

On the basis of these partial returns it looks as though Ford will be slightly in the lead for June with about 65,500 new car registrations. Chevrolet will be second with approximately 64,000, and Plymouth will maintain its third place with registrations in the neighborhood of 41,000 units.

Registrations of new trucks amounted to 34,000, an increase of 45 per cent over June, 1933, when 23,254 trucks were registered. However, they have followed the seasonal trend and show a drop of about 14 per cent from May, 1934, when 30,831 were registered.

Aircraft Values Off 36.6% Census Shows

Employees Declined 25% From 1931; Average Wage $1,330 Per Worker in '33

WASHINGTON—Total value of aircraft and parts produced in 1933 was $25,547,159, a decrease of 36.6 per cent from the 1931 total of $40,278,278, according to the biennial census of manufactures. The number of establishments reporting was 56 for last year and 101 for 1931.

Of the aircraft industry's income, $9,834,280 was paid out in wages last year, not including salaries to be reported later. This compares with wage payments in 1931 of $15,480,647, a decrease of 36.5 per cent. The average number of workers employed declined 25.1 per cent from 9,870 in 1931 to 7,389 last year. Average earnings per worker amounted to $1330 as compared with $1570 two years earlier. This earnings comparison, of course, throws no light on wage rates in the two years since part-time workers were counted in the number employed. Wage payments as a percentage of value of products ran slightly over 38 per cent in both years.

The more important items which contributed to the total for 1933 are as follows: Airplanes, 998, valued at $12,933,912; seaplanes and amphibians, 68, valued at $2,221,450; parachutes, propellers, and pontoons, $760,876; parts and engines made by aircraft manufacturers for sale separately, $6,010,174.

Preliminary statistics for 1933, with comparative figures for 1931, are given in the following table:

	1933	1931	Per Cent of Decrease
Number of establishments	56	101	—44.6
Wage earners (average for the year)	7,389	9,870	—25.1
Wages	$9,834,280	$15,480,647	—36.5
Cost of materials, fuel, and purchased electric energy	7,689,494	13,101,494	—41.3
Products, total value	25,547,159	40,278,278	—36.6
Aircraft and parts	23,559,972	35,737,978	—34.1
Experimental work, value	1,210,897	2,528,514	—52.1
Receipts for repair work	438,608	1,562,191	—71.9
Other products	337,682	449,595	—24.9
Value added by manufacture	17,857,665	27,176,784	—34.3

Report Hudson Wins Belgian Grand Prix

Does 1037.496 Kilometers in 10 Hrs.; Bently Next

DETROIT—A Hudson, driven by Colas, well known European racing driver, won first place in the over four litres category of the Belgian Grand Prix, according to information cabled to Chester G. Abbott, general sales manager of the Hudson organization.

The Hudson car covered 1037.492 kilometers during the 10 hour test, beating an English Bently by a wide margin, says the report. All cars competing were stock cars. This annual event which is known as the Endurance Grand Prix of the Royal Automobile Club of Belgium was held over the Spa Malmedy Francochamps Circuit. It is considered to be one of the best tests of automobiles in all of the foreign automotive sporting events.

Chevrolet Sends Caravan Touring Through Japan

DETROIT, July 20.—A caravan of 20 Chevrolet units that toured central and northeastern Japan proved so successful that another will be sent out to cover other regions, says a report from the Chevrolet plant at Osaka. The caravan left Osaka April 20 and remained on the road until July 2. Attendance at the exhibits staged en route was put at two million. At Kobe, 63,700 attended the first showing. All models of passenger cars and various truck models were included in the caravan.

While the caravan was on the road, the Osaka plant celebrated the completion of its 70,000th Chevrolet.

Green Joins Acheson

PORT HURON, MICH.—George C. Green has joined the technical staff of the Acheson Colloids Corp. and will be stationed in New York as first assistant to Raymond Szymanowitz, technical editor of the organization.

Show Question Is Finally Settled; Dealers to Stage Chicago Exhibit

NEW YORK—The "show question" appears to be settled. According to information released by Alfred Reeves, N.A.C.C. vice-president, the shows will be held simultaneously in New York and Chicago on the same dates as last year's shows. In both cities the shows will be under the auspices of the dealer associations.

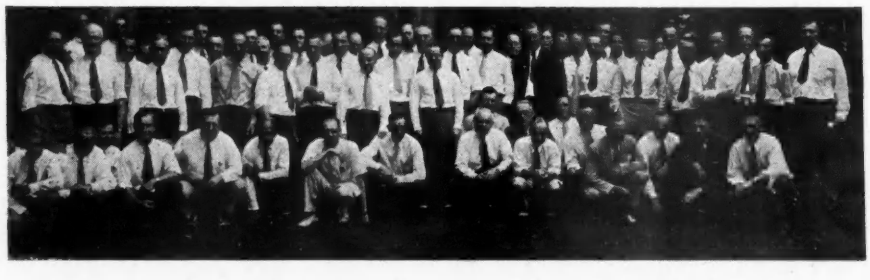
Announcement was made in *Automotive Industries* last week that the New York show would be under the egis of the Automobile Merchants' Association. But at that time the disposition of the Chicago situation had not been announced. However, since then the N.A.C.C. has voted to let dealer organizations in both cities conduct the exhibitions.

Following the New York show it is stated the usual dealers' shows in such cities as Philadelphia, Newark, Cleveland, etc., will be held during January, February and March. Dealers in territories adjacent to New York and Chicago will be extended the courtesies usual in the past. Both the big shows will be open to all manufacturers, and it is expected that the Ford Motor Co. will participate.

As in the past foreign dealers will be invited to visit the New York and Chicago exhibits, and foreign manufacturers will be asked to contribute displays if they choose.

As has already been announced no private shows will be held in hotels or other temporary salesrooms because under the new arrangements they will be unnecessary.

Officials of the Motor and Accessory Manufacturers' Association have stated they would sanction the New York and Chicago shows as usual for their members.



Sixty rim, wheel and tire manufacturers of the country who held their annual convention in South Bend at the Bendix Corp. plant. The picture was taken at Bendix Manor, South Bend home of Vincent Bendix

African Chiefs Visit British Motor Works

The Sultan of Sokoto, the Emir of Kano and the Emir of Gwandu photographed during their inspection of the Morris Motor Works at Oxford recently

Automotive Industry Accident Rate Climbs

National Safety Council Reports 35% Increase Over Record for 1933

CHICAGO—The accident rate in the automobile industry for 1933, according to a survey just completed by the National Safety Council, increased 35 per cent over the 1932 figure with a 3 per cent increase in the severity rate. The 1933 frequency rate was 19.41 for disabling injuries within the industry and the severity rate 1.02. The figures are based on records of 53 plants reporting to the council.

The National Safety Council defines a disabling injury as one arising out of or in the course of employment resulting in death, permanent total disability, permanent partial disability or temporary disability. The term "frequency rate" means the number of disabling injuries per 1,000,000 man-hours of exposure; the severity rate is the number of days lost as a result of disabling injuries per 1000 man-hours of exposure.

Despite the increase in frequency and severity there was no increase in the frequency of fatalities and permanent partial disabilities. The sharp rise in the general frequency rate resulted entirely from more temporary disabilities.

Large units in the automobile industry have an average frequency rate of 19.53 in 1933, while small units averaged 20.87. In severity, large companies did even better, with an average rate of 0.90, compared with 1.52 for the small units. This difference is a reversal from the 1932 experience, when small plants had a considerably lower average severity than large units.

The better average records of large plants were characteristic of each division of the industry except in manufacture of automobile parts in which small plants averaged 17.27 in frequency, compared with 18.97 for large units; corresponding severity rates were 0.61 and 1.85.

George Herbert Stansbury

LOUISVILLE, KY.—George Herbert Stansbury, 72 years old, former vice-president of the Standard Oil Company, of Kentucky, died Wednesday night at Newdorp, Staten Island, N. Y., where he was vacationing with his wife and one of their sons.

Mr. Stansbury suffered a stroke a year ago and has been in ill health since. His death was attributed to a heart attack. Mr. Stansbury left Louisville July 1 for his vacation at Cedar Grove Beach Club at Newdorp, near New York City.

As a young man he went to the Pennsylvania oil fields and became connected with the Atlantic Refining Company. Later he joined the Standard Oil Company and was associated with that organization for forty-five years and came to Louisville as vice-president of the Standard Oil Company of Kentucky in 1912 and retired in 1920.

James J. Whitty

DETROIT—James J. Whitty, 53 years of age, died Saturday (July 21), after an illness of a year. He was secretary-treasurer of the Monarch Manufacturing Co.; vice-president of the Krigner Tripoli Forging Co. and president and treasurer of the Lincoln Forging Co.

GM Truck Adds New Medium Duty Model

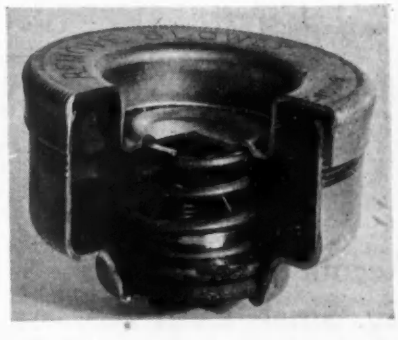
Has 5 Tons Capacity; Base Price is $2,135

PONTIAC, MICH.—General Motors Truck Company has announced another addition to its truck line, the T-46 of 5 tons capacity, to round out its medium duty line. A base price of $2,135 has been set on this model.

The T-46 is powered with GMC's "331" engine, which develops 94 h.p. at 2,500 r.p.m. (governed speed), and 230 lb-ft. torque at 800 to 1,400 r.p.m. Engine features include pump and fan drive by dual belt, Stellite seats for the exhaust valves, down-draft carburetion, counterweighted crankshaft, harmonic balancer, 3-point, rubber-insulated engine mounting and an AC Triplex air cleaner. The clutch is of the double-disk, multiple-spring type, mounted in the fly-wheel housing on ball bearings, and the transmission is of the four-speed, heavy-duty truck type. A five-speed overdrive transmission is available at extra cost, or an underdrive type with helical gears that furnish silent operation in the most frequently used speeds.

General Tire & Rubber Strike Ends; 1100 Out

AKRON—Striking employees at the plant of the General Tire and Rubber Co. returned to work this week. More than 1100 workmen were involved in the strike which lasted about four weeks. The end of the strike permitted 500 office workers also to return whose idleness had been enforced because of the disturbance.



This illustration shows the dual-valve filler cap used in the closed cooling system of the Hupmobile as described in Automotive Industries of July 21. One valve relieves the pressure at 3½ lb. per sq. in. while the other limits the vacuum in the cooling system to 0.2 in. of mercury column. The assembly was developed by the H & H Tube Co. of Detroit

Buick Surveys First Half of 1934; Payrolls Up $6,000,000 Over 1933

FLINT—A survey of Buick operations for the first six months of the current year reveals that $10,500,000 in new purchasing power was made available through Buick employees by increased employment and increased wages. This represents an increase of more than $6,000,000 over the corresponding period for 1933.

Among other things the survey revealed were:

Approximately 100 per cent more men were on Buick payrolls from January 1 to July 1 than were at work during the same six months of 1933. These men collected $2.50 for every $1 paid out during the same time last year.

Thus far this year there has been an average of 14,199 men employed daily as compared with an average of 7,183 in a like period of last year. This means employment has been maintained at a steady level in the neighborhood of 14,000, while a year ago employment slumped as much as 2,400 in a single month.

During the first half of this year the monthly average of wages and salaries paid by the Buick organization was $1,754,879; during the same period last year the monthly average was $698,605.

The Buick assembly line operated 116 days during the first six months of this year.

The comparative record for 1934 and 1933 follows:

	1934 Employment	1933 Employment
January	12,692	9,216
February	14,936	8,719
March	14,454	6,296
April	14,466	6,102
May	14,287	6,265
June	14,359	6.500
6 Mo. Average	14,199	7,183
	Payroll	**Payroll**
January	$ 1,627,739	$ 953,231
February	1,724,335	724,655
March	1,725,963	453,098
April	1,844,366	532,015
May	1,822,015	725,959
June	1,785,221	803,277
Monthly Average	1,754,879	698,605
Six Month	10,529,279	4,192,235

Accounting Co. Hits Ky. Small Loan Act

LOUISVILLE, KY.—"Automobiles are as much a necessity of life as radios and household furniture," was the claim of John R. Allen, attorney of Lexington, arguing before the Federal Court at Lexington, Ky., sitting in banc, in an injunction suit of the National Accounting Company vs. James R. Dorman, State Banking Commissioner, in which the accounting company has attacked the 1934 small loan, or loan shark act of the legislature, as being unconstitutional.

Judge Charles I. Dawson, Louisville, one of the three judges hearing the proceedings, asked Allen if he did not believe that the state legislature had the right to exempt automobile financing companies, or agencies, because automobiles are not "necessities" and the average person is not required to obtain financing companies to make loans to purchase them.

Allen had previously held that the act violated Federal and State Constitutions in that it extended exclusive privileges to one class of business and attempts to regulate interest, the special privilege charge being based on a clause of the act which exempts automobile financing companies, which, Allen contended, are engaged in exactly the same business as his clients are, and can charge whatever rate of interest they please, while the small loan concerns must stay within specified limits.

Canadian Imposts on U.S. Gasoline Down 1¢ per Gal.

OTTAWA, ONT.—An order-in-Council which will have the effect in many cases of lowering the imposts on United States gasoline, coming to Canada, by one cent a gallon has been passed by the Dominion Government. The order is based on authority of two bills passed in last session of Parliament, amending the customs act so that special taxes levied by the United States on products there might be disregarded by Canadian customs appraisers in deciding on the fair market value of any product.

300,000 Owners Reply to GM's Questionnaire

DETROIT—During the past 18 months over 300,000 automobile owners have responded to General Motors' picturized questionnaires dealing with various features of automotive design. The questionnaire covers 65 features of automobile construction.

Wholesalers Seeking Ample Profit Margins

NSPA Division Petitions Manufacturers to Suggest Resale Price, Jobber Nets

DETROIT—The wholesalers' division of the N.S.P.A. at a recent meeting adopted a resolution for presentation to manufacturers and manufacturing groups recommending that immediate steps be taken to provide necessary arrangement which will enable wholesalers to show an adequate gross profit through sales operations.

It was recommended that manufacturers and manufacturer product group (1) suggest resale prices; (2) that resale prices and jobber nets be established upon a basis that will allow wholesalers an adequate gross margin of profit, and (3) list prices be established by independent manufacturers that are comparable to and competitive with list prices of car manufacturers.

The recommendations were made in the form of a resolution which stated that the system of free and open competition in distribution of automotive aftermarket materials has resulted in the development of trade practice abuses on the part of both manufacturers and wholesalers.

Six Months Statement

Vehicle Companies	1934	1933
3 Companies Reported	—$2,642,750	—$1,365,535
Packard Motor Car Co.	— 2,968,144	— 1,109,870
Hudson Motor Car Co.	— 618,160	— 1,326,465
Checker Cab Corp.	— 221,280	— 151,857
General Motors	+64,997,503	+43,478,441
Total—7 companies	+$58,547,169	+$39,524,714
Other Automotive Companies	**1934**	**1933**
2 Companies Reported	+ $323,162	—$1,018,822
Budd Manufacturing Co.	+ 64,767	— 303,550
Budd Wheel Co.	+ 148,609	— 287,083
Eaton Manufacturing Co.	+ 776,557	+ 31,253
Hayes Body Corp.	— 5,721	— 198,121
Indian Motocycle	+ 73,967	— 49,330
Johns Manville Corp.	+ 173,855	— 861,959
Douglass Aircraft	— 356,552	+ 137,906
Young Spring & Wire Co.	+ 667,550	+ 236,304
Allis-Chalmers Mfg. Co.	— 822,253	— 1,658,907
Libbey-Owens-Ford	+ 2,532,319	+ 2,137,083
Bohn Aluminum	+ 1,138,019	+ 609,904
Briggs & Stratton Corp.	+ 460,081	+ 61,633
Ex-Cel-O	+ 200,234	— 99,756
Raybestos-Manhattan	+ 719,800	+ 229,396
Total—16 companies	+$6,094,394	—$1,034,049

Chrysler Engineers' Club Officers: G. B. Allen (lower left) president; A. S. Sinclair (lower right) vice president; M. L. Carpentier (upper left) secretary-treasurer; L. J. Woolson (upper right) member-at-large

Truck Asso. Asks Highway Fight Aid

Organization Emphasizes Economic Dependence upon Motorized Transportation

PHILADELPHIA—The Pennsylvania Motor Truck Association, representing 215,000 commercial vehicles in that state, has issued an appeal for the support of all business and industrial interests in its fight to preserve the reasonable rights of commercial vehicles on the public highways.

In the appeal the association points out that recent strikes in Toledo, Cleveland, St. Louis, Minneapolis and San Francisco have forcefully reminded the country that paralysis of truck transportation is capable of paralyzing community life. The fact that large cities depend upon modern vehicle transportation service for day-to-day supplies is emphasized and that many smaller communities are dependent upon truck and bus operation for their whole contact with the outside world.

The appeal of the association also criticizes the prejudice against this facility of transportation on the part of passenger car drivers and strikes boldly at the hostile propaganda of interest which "mistakenly imagine they would profit from suppression of highway freedom." The necessity of effective cooperation between business, community and industrial circles to overcome such prejudice and hostility is pointed out by the P. M. T. A.

Code Steel Prices Canadian Duty Base

Revenue Department Rule Filed Rates Acceptable As Fair Market Values

OTTAWA, ONT.—In a bulletin issued by the Department of National Revenue, customs officers are instructed to accept the values of steel products fixed by the NRA code as the fair market values for duty purposes. The bulletin states:

"For the present and until otherwise ordered, iron and steel products covered by the code of fair competition for the iron and steel industry under the National Recovery Act may be allowed entry for regular duty purposes on the value under the code at the basing point for the product established under the code nearest to delivery point in Canada, although shipped from other points.

"The value for special or dumping duty purposes at the place of shipment will be upon the basis of the price at the said nearest basing point for the product, plus all rail freight to destination in Canada, less the freight from shipping point to destination."

The ruling becomes effective on August 1.

Hudson Launches Nation-Wide Newspaper Campaign

DETROIT—The Hudson Motor Car Co. has launched a nation-wide newspaper advertising campaign under the general heading of "A Wide Open Challenge." Competitors are invited to pit their cars against either Hudson or Terraplane in tests which would bring out economy, acceleration and hill-climbing ability.

The Hudson company always has been a large and consistent user of advertising space, this medium forming the backbone of practically every advertising campaign put on by the company.

Mooney Urges Support For President's Reciprocal Trade Agreement Efforts

NEW YORK—Support of President Roosevelt and Secretary of State Hull in their efforts to negotiate reciprocal trading agreements with foreign powers was urged by James D. Mooney, president of the American Manufacturers Export Association and president of General Motors Export Company, in an address this week before members of the association and broadcast over a coast-to-coast network. Mr. Mooney also warned that the United States is lagging behind in world trade while other nations are forging ahead and making advantageous arrangements for themselves.

"A great many foreign nations have seized the opportunity to make trading arrangements among themselves," Mr. Mooney said, "and these arrangements have resulted already in a substantial increase in their exchange of goods, while we have been sitting on the sidelines waiting for some sort of a miracle to happen. Also, as Mr. Peek has so ably pointed out in his letter to the President, we have very foolishly tried for a number of years to sell our goods abroad without taking anything real or tangible in exchange for them. Despite these lapses, I feel that we still have enough of our traditional Yankee shrewdness left in our make-ups to guarantee that we can get a full and profitable share of world trade if we really set out to get it, and that we can very definitely live up to our old-time reputation as good horse-traders in any bargains we drive.

"It is a very remarkable coincidence that employment in the United States has reached its peak when foreign trade —including imports—was greatest, and that it has struck its lowest depths, notably in 1932, when foreign trade was almost dead."

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Despite the labor unrest here and there, business sentiment held up quite well last week. The labor situation on the Pacific coast appears to have improved, and difficulties in other sections of the country are expected to be settled shortly. There was an improvement in retail sales, and wholesale business was more active. The wheat market was very active last week, and heavy buying was prompted by unfavorable crop reports and the continued dry weather.

Car Loadings Increased

Railway freight loadings during the week ended July 14 totaled 602,778 cars, which marks an increase of 82,971 cars above those during the preceding week, a decrease of 50,883 cars below those a year ago, and an increase of 99,017 cars above those two years ago.

Store Sales Rise

Sales of twenty-six store chains, including two mail-order companies, during the first six months of this year were about 15 per cent above those in the corresponding period last year. The sales of the two mail-order houses alone increased about 23 per cent.

Power Consumption Off

Production of electricity by the electric light and power industry in the United States during the week ended July 14 was slightly below that in the corresponding period last year. This marks the first weekly decline below a year ago since the week ended April 29, 1933.

Food Prices

The index of retail food prices compiled by the Bureau of Labor Statistics stood at 109.6 on July 3, based on the 1913 average as 100, as against 109.1 on June 19 and 108.4 on June 5.

Life Insurance Strong

Sales of ordinary life insurance in the United States during June maintained the rate of improvement that set in at the beginning of this year. The June total was 17 per cent above that in the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended July 21 stood at 78.1, as against 77.9 the week before and 77.8 two weeks before. The current figure is the highest for any week during this year.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended July 18 showed very little change. Holdings of discounted bills, of bills bought in the open market, and of government securities remained at the same levels prevailing a week earlier.

AC Spark Plug Develops Shatterproof Signal

FLINT, MICH.—A new shatterproof series of reflex signals in red, green, amber and white, developed specially for buses, trucks and trailers, is announced by the AC Spark Plug Co. The new reflectors are a companion line to the regular AC reflex signals. To assure maximum visibility, the lens is silver-plated on the back, and the silver is protected by copper-plating and a sprayed coat of aluminum lacquer.

The case in which the reflector is fitted is filled with asphalt. This prevents shattering should the lens be broken and preserves the reflecting characteristics of the signal even though the lens should be badly fractured. The asphalt also protects the silvered surface against water and condensed moisture.

1144 Deisel Unit Sales Netted $4,704,540 in '33

WASHINGTON—Sales of diesel and semi-diesel engines in 1933 were valued at $4,704,540 representing 1144 units with a rate capacity of 139,191 horsepower, according to the Census of Manufactures. These totals are based on reports from 22 companies which in the 1931 census reports sales of 1160 units valued at $9,891,406 and with a rated output of 224,086 horsepower. Average horsepower per unit sold was 122 in 1933 as compared with 196 in 1933.

Sales of marine type diesels number 208 in 1933. Of the stationary type, 567 were sold while the volume of automotive and railway units amounted to 61. Semi-diesel sales totaled 308 units.

Goodrich Has New Low-Pressure Tractor Tire

AKRON—A new low-pressure tire for the front wheels of farm tractors has been announced by the B. F. Goodrich Co. Pneumatic tires on farm tractors so far have been open to the objection of making steering uncertain on soft ground, on ridge rows, and on side hills. This the new tire, which has a heavy, circumferentially-ribbed tread, is designed to overcome. With these tires on the front wheels it is claimed to be possible to hold the tractor to a true course on turns, and side slip on hills is said to be eliminated. The tire is available in the following sizes: 5.25-16, 6.00-9, 7.50-10, 6.00-16 and 7.50-18.

Say British Automobile Production Near Record

WASHINGTON—The British automobile industry is booming, according to a report from Consul George A. Makinson, Birmingham, made public by the Commerce Department. Judging from present indications, Consul Makinson declares, the industry is headed for another high production record in the current year.

The principal demands of the past few months, it is pointed out, have been mainly on account of the home market, although a steady and increasing volume of export trade, chiefly with the British colonies and certain European countries, has been maintained.

May Close Citroen Copenhagen Plant

WASHINGTON—According to a report received at the Department of Commerce, the Citroen factory in Copenhagen, Denmark, will close in the very near future owing to the impossibility of obtaining import licenses. Citroen cars are not assembled in the same manner as American units and very little of the work is done in Denmark.

Ex-Cell-O Opens Office

DETROIT — The Ex-Cell-O Aircraft and Tool Co., through its sales engineer, William S. Gallagher, has opened a sales office in Buffalo. The new office is located at 1807 Elmwood Ave.

Ford Considers Building "V-9" Motor For New Streamlined Railroad Trains

NEW ORLEANS—In an interview given Meigs O. Frost of the New Orleans *Times-Picayune* states staff and copyrighted by the Times-Picayune Publishing Co., Henry Ford speculated upon the production of a Ford V-9 motor for use in the new streamlined railroad trains and said he thought his company would build such a motor just as an experiment. Mr. Ford told Mr. Frost he had been discussing the matter with his son, Edsel.

The Dearborn manufacturer went on to say that he still believes the real foundation of this country's greatness has been its ability to solve problems "that didn't have the answer in the back of the book." Mr. Ford believes that "mankind should produce forever more," and that the automobile has reached only the "ox-cart and corduroy road stage of development." He said:

"America is suffering from too many conferences and boards of directors. A boss with an idea gets somewhere. He doesn't fritter away valuable time talking to himself. He'll make mistakes. I've made them. But if he can't recognize his mistakes and correct them before they are fatal he has no business being boss; he won't be boss long.

"When I heard that the automobile industry was going to be started toward recovery by a group of political experts, I asked: 'Who are these supermen? I've been looking for such men all my life.'

"The recovery we need is our spirit of American independence. Something has happened to American independence and individualism. Americans used to have convictions and fight for them. I remember when I was a boy seeing men arguing in the street and fighting with their fists over their ideas. . . . It would be a healthy symptom to see them again.

"I believe America's educational system is all wrong. It turns out millions of high school graduates looking for any kind of a job and not fitted for any one job in the work, unless it might be lecturing. That is why I started my two schools in Dearborn—the Edison Institute and the Henry Ford Trade School. Every child has a natural bent. Every child should be trained to use head and hands both on that natural bent."

Mr. Ford was asked about his fortune. He replied:

"There is no Ford fortune. Not as I understand a fortune. A fortune to me is something a man hoards and on which he lives in idleness. Money to me is something that enables me to get what I produce to you, the way a postage stamp gets a letter from me to you. And who hoards postage stamps?

"This cry of overproduction! It's a money cry, not a human cry. Mankind should produce forever more. Never yet in the world's history has enough of any good thing been produced for use.

"Automobiles today are in the ox-cart and coduroy stage of development. It took 30 years of this century to produce the V-8 Ford. The next 10 years are going to produce a low-priced car as far ahead of today's V-8 as it is ahead of my first Model T. And 10 years is a fraction of a second in history.

"I was talking to my son, Edsel, about it. I told him we should build a V-9 motor that will develop 1000 hp. and try it out on one of these new streamlined railroad trains. I think we'll do it just as an experiment."

Asked about what plans he had made for the continuance of his business following his death, Mr. Ford answered:

"What the devil can I do about it? I am not thinking about that at all. I have enough to do today."

Henry Ford
"—mankind should produce for evermore"

Oil Investigation Interests Diesel Group

WASHINGTON — The investigation into prices being charged for fuel and heating oils ordered by Secretary of the Interior Ickes should be of some interest to those concerned in the manufacture and operation of automotive Diesel equipment because of the close relation between domestic fuel oils and the fuels used in high speed Diesel engines.

The investigation is the result of information collected in recent weeks by the Petroleum Administrative Board, indicating general price increases. The board will hold a public hearing July 30, to which the Consumers' Advisory Board and code authorities of other industries have been invited, along with all other consumers who wish to be heard.

Citroen and Peugeot Add New Models

The announcement of the new front-drive Citroen has been followed quite closely by similar announcements by Citroen's chief competitors, Renault and Peugeot. Renault's new model, known as the Celtaquatre, is a four-passenger car of 8 hp. tax rating which is said to have shown a maximum speed of more than 69 m.p.h. on Monthlery track and a fuel mileage of 30 per U. S. gallon between Paris and Bordeaux. The body has been redesigned for reduced air resistance and more attractive appearance, and much attention was given to the cost factor. The fact that the vehicle is not an entirely new design but a development of an earlier model permitted keeping manufacturing costs down. The Celtaquatre has a displacement of 91.5 cu. in. and sells at $1,110 (at current rates of exchange). Peugeot's new model, the 601, is in a higher-priced class, selling at between $2,000 and $2,400. The engine is a six-cylinder of 128-cu. in. displacement; the car has a tubular backbone, and its front wheels are independently sprung by means of a half-elliptic cross spring and links to the front end of the frame, a system that has been used on other Peugeot models for some years.

Tool, Die, Machine Shop Budget Approval Asked

WASHINGTON — The Code Authority for the special tool, die and machine shop industry has made application to the National Recovery Administration for approval of its budget and the basis of contribution by members toward the expenses of administration of its code. The total amount of the budget is $49,885.

The method of assessment is at the rate of one-tenth of 1 per cent of gross sales (less discounts and returns), payable quarterly in advance. Members whose gross sales are not of sufficient dollar volume to make such proportionate assessment yield a minimum of $20 a year, an arbitrary assessment of that amount will be made against such members.

F. B. Heitkamp Leaves Cincinnati Milling

CINCINNATI — Frederick B. Heitkamp, general sales manager of Cincinnati Milling Machine and Cincinnati Grinders, Inc., resigned this position to become a member of the executive staff

F. B. Heitkamp

of Lyon Metal Products, Inc., Aurora, Illinois. Mr. Heitkamp assumed his new duties July 1, concentrating on marketing and sales research problems.

Lyon Metal Products, Inc., also have plants in Chicago Heights, Jersey City and Los Angeles. They manufacture principally steel lockers, steel office furniture, metal card tables and chairs, and store lockers and cabinets.

New NRA Policies

(*Continued from page* 92)

This new declaration of policy on the averaging of work hours over a period of weeks or months to provide sufficient flexibility to care for peak demands or labor shortages, is a drastic modification of the former policy and is based upon the conclusion that the former policy had proved unsatisfactory and that code provisions governing it had often been misinterpreted. Briefly the new policy provides that "a stated maximum (of hours) with a proviso for a definite tolerance (on a weekly or daily basis) may be provided. . . . Where a definite tolerance is not sufficient, particular defined circumstances, such as emergency maintenance and repair, may justify unlimited tolerance, with payment of overtime for all time in excess of the maximum." In other words a reasonable number of work hours will be established by code provision and all extra hours necessary to properly perform the work of an industry will be allowed provided proper compensation is paid employees for the excess time.

Under the new plan for classification of customers it is recommended that code authorities keep a current classification of all types of customers. Use of coercion to influence the inclusion or exclusion of any customer would be a code violation. This policy was adopted, it is understood, because experience has shown that proposals by industries for mandatory classification sometimes attempts to exclude certain types of distributers from the distribution of a product. The proposed classification lists would be available to all who care to see them.

Under the policy covering definition of costs of materials for codes which provide for a cost formula, cost is described as "actual cost or market, whichever is lower." When an industry holds an inventory it can invoice it at the cost of materials or the market price, whichever is the lower. This plan is said to have been adopted instead of that of either market or cost in order to avoid requiring mandatory profit to those who have accumulated inventories at a low price and also in order to avoid shifting the cost formula from time to time to a basis most favorable at the moment to industry.

Fewer Workers Employed in Michigan Car Plants

DETROIT — Automobile employment in Michigan during June totaled 266,069 compared with 293,496 in May and 147,883 in June, 1933, based on reports of 113 companies, according to the State Dept. of Labor and Industry.

Aggregate weekly payrolls amounted to $6,490,473 in June, against $7,330,964 in May and $3,618,216 in June last year.

Average weekly earnings per capita were $24.39 in June, $24.98 in May and $24.47 in June, 1933.

July Total 260,000 Predict August Cuts

(*Continued from page* 91)

A strong upward trend in retail deliveries of new Airflow De Soto cars was reported this week. Sales during the week ended July 14 were 26.2 per cent more than during the previous week.

Graham-Paige sales in June were 70 per cent greater than in the same month last year. Total sales of Graham cars, including export, in June were 2,157 units, as against 1,277 units in June, 1933. The June total also represented an increase of 15 per cent over the 1,883 Graham cars sold to consumers in May. Graham sales volume in the first six months of 1934 ending June 30 totaled 11,455, which was 210 units more than total sales in all of 1933.

Exports of Terraplane and Hudson cars for the first six months of 1934 reached a total of 8,218 as compared with 2,777 for the corresponding six months of 1933, and 4,824 for all of 1933.

During the months of May and June Hudson's exports totaled 3,566 units as compared with 1,195 for the two-month period of last year.

Commission Urges Hiring Sub-Standard Workers

WASHINGTON—Employers in industry are urged to adopt a "right-minded and socially desirable attitude" toward sub-standard workers and hire a "proper proportion of these handicapped workers" in the report filed by the commission appointed by General Johnson to study the problem of dealing with this element of society.

The commission's report states that unless employment through the normal channels of industry and commerce is furnished these workers they will have to be maintained in idleness at a tremendous cost to the public.

CALENDAR OF COMING EVENTS

SHOWS

American Transit Assoc., Cleveland, Ohio ..... Sept. 22-27
Cleveland (Automotive Service Industries) ..... Nov. 19-23

MEETINGS

American Chemical Society, Cleveland, Ohio ..... Sept. 10-14
American Welding Society, New York City ..... Oct. 1-5

ANNUAL MEETINGS

Natl. Assoc. of Motor Bus Operators, Cleveland ..... Sept. 21-22
Natl. Safety Council, Cleveland, O., Oct. 1-5
Institute of Traffic Engineers, Cleveland ..... Oct. 2-3

CONVENTIONS

American Society for Metals, New York City ..... Oct. 1-5
American Transit Assoc., Cleveland ..... Sept. 24-27
International Foundry Congress, Philadelphia ..... Oct. 22-26
American Foundrymen's Assoc., Philadelphia ..... Oct. 22-26
National Foreign Trade Council, New York ..... Oct. 31-Nov. 2

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. ..... Dec. 3-8

JUST AMONG OURSELVES

The Big Three and The Independents

COMPARISONS of the domestic retail car sales for the first five months of 1933 and 1934 reveal some interesting facts and provide the basis for some interesting speculations. Use of round figures will facilitate the discussion.

The Big Three — Chrysler, General Motors and Ford—did 91 per cent of the business this year and 89 per cent last. Ford increased from 19 to 30 per cent in his proportion of total sales and Chrysler 21.8 to 23.2 per cent, while General Motors dropped from 48 to 37.5 per cent of total sales. The Chrysler gain slightly exceeds the percentage of total business lost by the independents.

Three independents who this year have increased their percentage of total as compared to last are Hudson, Nash and Continental. Nash had an extremely low year in 1933 and Hudson showed an increase from 2.4 to 3.5 per cent.

Six independent companies, on the other hand, have failed to equal last year even in actual sales, despite a total gain for the industry of 52 per cent from 508,262 to 771,479. This group comprises Auburn, Austin, Franklin, Hupmobile, Packard and Willys-Overland.

Studebaker, whose reorganization is definitely in progress now, and Graham both have increased sales as compared to last year and have just about held even their percentage of total. As compared to its own 1933 five months' performance, Studebaker has gained about 35 per cent; Graham about 40 per cent. Pierce-Arrow recorded an increase in sales but a decrease in percentage of total volume.

* * *

To Merge Or Not To Merge

FIGURES of this kind can be made to mean almost anything one wishes. Slight changes in the basis of computation can be made to bring about great variations in apparent indications. So, interpretations must be approached warily.

One point is clear. The independents at the moment show no signs of making inroads on the market dominance of the Big Three.

With the independents, particularly, interpretation of the sales records without correlated interpretation of balance sheets and profit and loss statements may readily lead one astray.

Then, too, management leadership is a factor—even more difficult to appraise accurately — which must be examined in any attempt at visioning future trends and prospects.

Mergers might be helpful in some instances—and if wisely made, permanent success is not only possible but likely.

The requirements, however, are leadership and financing—and these elements can be provided just as effectively without mergers in some instances. A merger is not of necessity an improvement. Three men in a four-legged race do not cover a given distance as quickly as would the three men running separately side by side.

A merger often brings new possibilities for cooperative achievement which the companies individually could not have had; it always brings new responsibilities for effective coordination of previously unrelated activities.

The right merger has a good chance for success in the automobile future.

* * *

Competition Among The Big Three

ONE small point is of interest in connection with the oft-discussed question—the big corporations against the independents. Ford's gain in proportion of total sales was made almost entirely at the expense of General Motors. To achieve a similar gain without taking it from General Motors or Chrysler would have meant that *all* the independents would have had to be put out of business!

It will be a long while before Ford, General Motors or Chrysler worry as much about all of the independents put together as about either one of the other two of their Big Three. And therein lies a good opportunity for some independents.

* * *

You Should Read It

YOU should read without fail the article by James Calhoun entitled "How Unequal Distribution of Wealth Hampers Advertising" which appears in the July 5 issue of *Advertising and Selling*. Reading time about 9 minutes. It is packed with facts, interestingly presented, to back up the thesis that "well distributed wealth holds a decided advantage over massed wealth as a stimulus to industry and distribution." We consider this to be a really important article.

—N. G. S.

160 Spot-Welds

by Joseph Geschelin
Engineering Editor, Automotive Industries

BY combining certain features of spot and projection welding in a new welding principle, the Chrysler Corp. has initiated one of the major developments in modern welding technique. The machines, by virtue of an unique principle, are called multi-hydromatic welders in which a varying number of hydro-electric guns are mounted in fixed positions about a fixture depending upon the form of the work piece.

The guns are connected in banks to a com-

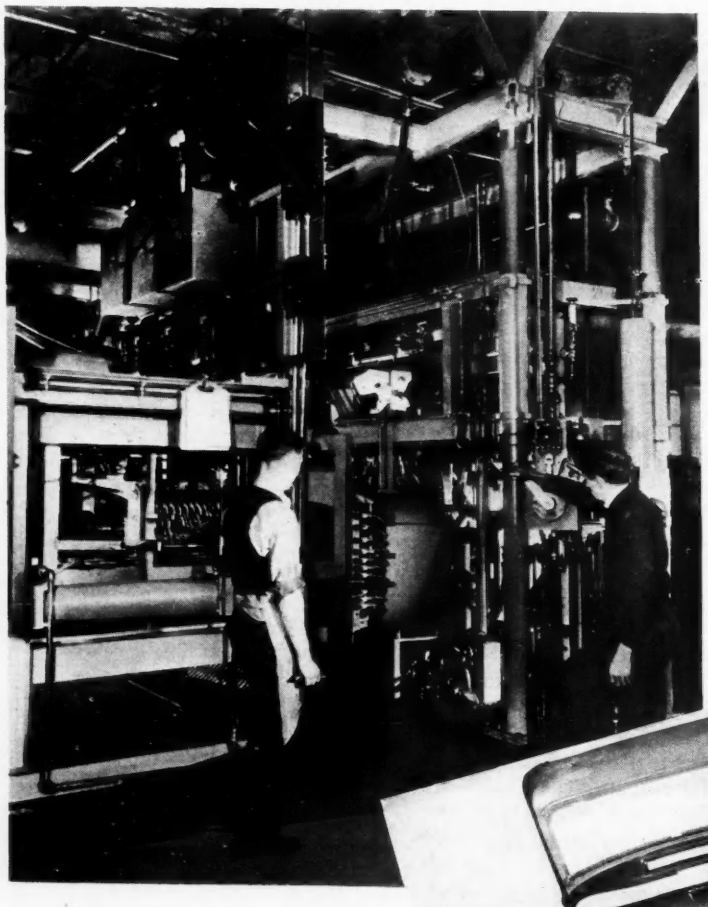


Fig. 1—This is one of the largest multi-hydraulic welding machines in the Dodge body shop. It produces the entire cowl section consisting of the nine parts shown in Fig. 2, completing a total of 160 spots in 45 seconds. In operation, the head at the right moves down for welding and up for unloading, the horizontal head at the left moves in for welding

Fig. 2—These nine stampings make up the parts for the cowl assembly welded on the machine in Fig. 1

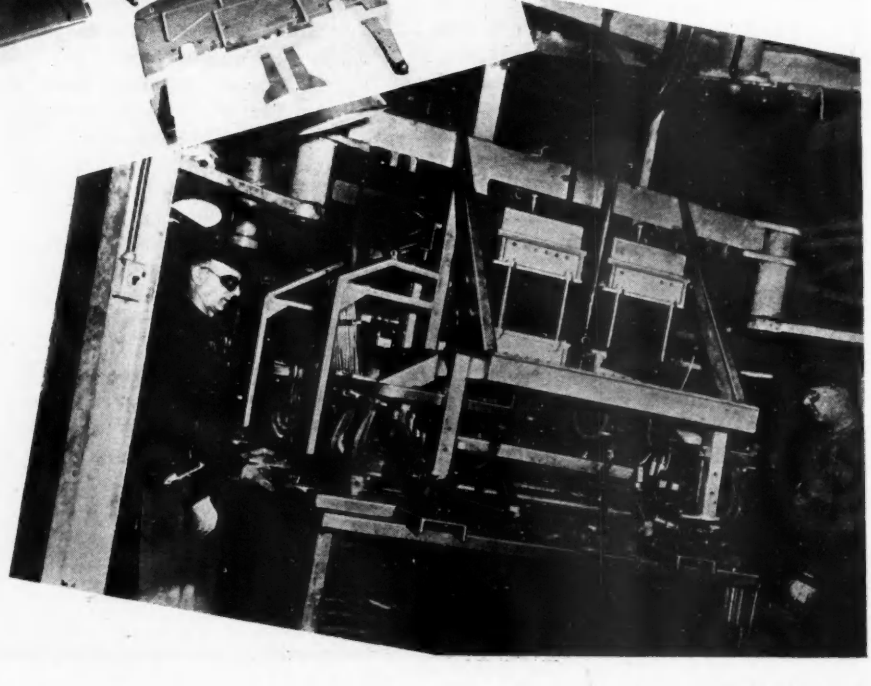


Fig. 3—Another welder illustrating the flexibility of the method is part of a battery of welders mounted over a conveyor line fed from a battery of presses producing underbody stampings. Fig 4 shows the group of twenty underbody stampings, loaded from the conveyor immediately below each welder, clamped in the fixture, and welded into a unit in one setting

in 45 Seconds!

One of the accomplishments of the new multi-hydromatic welders which are increasing the speed and precision of body production in Chrysler Plants

mon distributor, comprising a system of secondary welding circuits from a common bus bar, as well as common source of oil pressure. Each bank is operated by a special automatically controlled mechanism timed to bring the guns into action, one at a time in rapid sequence. The guns contact the work in the proper position whether vertical, horizontal or at an angle, for a predetermined time interval and with a measured amount of welding current.

Depending upon the number of spots handled in one operation, the machine is provided with one or more banks of guns, each bank with its own timing and control station.

A large battery of multi-hydraulic welders has been in use for some time at Dodge Bros. in the production of 1934 bodies, cowls, fenders, underbodies and other units. Similar welders are employed by Chrysler in the production of Airflow bodies.

In practice, the hydromatic units are fitted to permanent steel fixtures designed to handle the various parts. The machine then operates as a unit activated from a main hydraulic valve which is opened by the operator when all the panels are clamped in place. Welding guns start in sequence and when the welds are completed, the fixture opens automatically, ready for the removal of the finished part.

One of the outstanding features of this process is the fact that only a small transformer is required for each bank of guns, since only one weld is made at a time. This also results in longer tool life and less tool maintenance since each welding tool is required to handle only one spot per operation instead of taking every spot in the panel as is customary.

Apart from the improvement in welding speed and general precision, the new method standardizes the floor-to-floor time by eliminating the human element that is usually present in welding work. The function of the operator now is limited to loading, starting, and unloading, with no variable time allowance for the handling of welding tools, maneuvering into difficult places, etc.

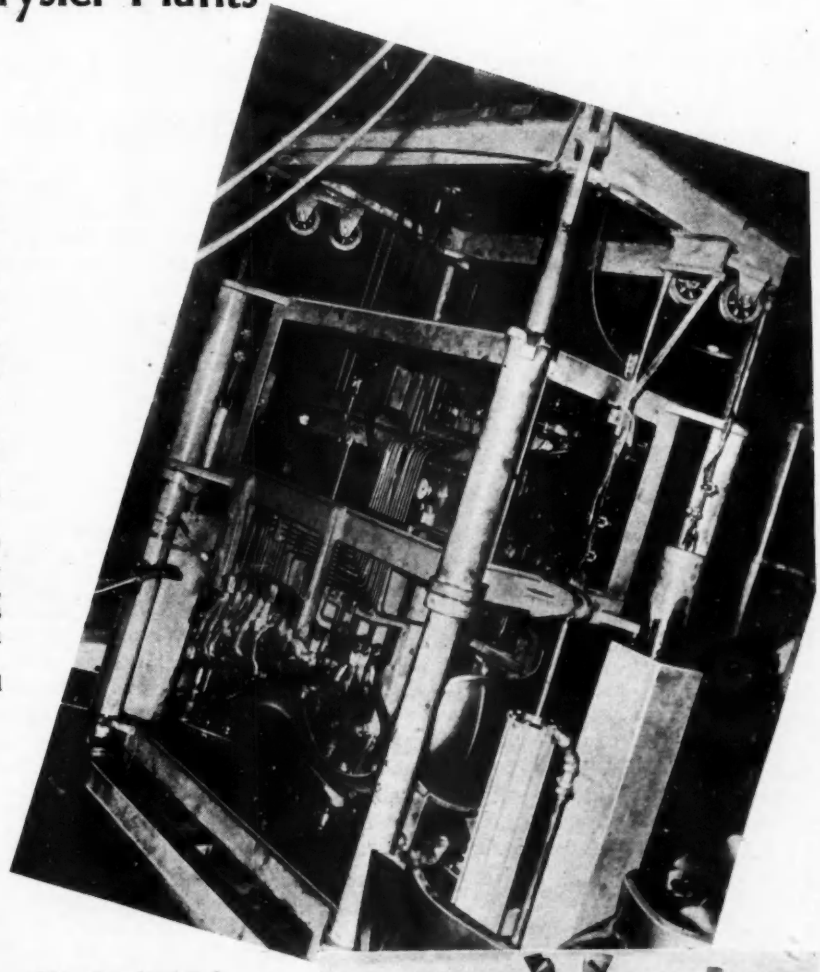


Fig. 5—A simple application designed to weld the reenforcement strip on front fenders. The operation comprises a total of 70 spots, yielding an output of 120 fenders per hour

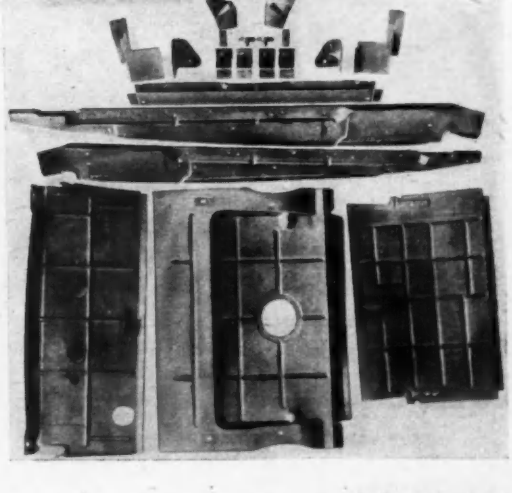


Fig. 4—Twenty underbody stampings which are welded into a unit on the machine shown in Fig. 3

Most British Makers Expect to Offer

Built-In Jacking S

More than a dozen producers now furnish them as standard or optional equipment—lower bodies with more overhang are stimulating adoption

ALTHOUGH jacking equipment permanently attached to the axles was introduced in England with a great deal of publicity some 20 years ago, it became standard or optional equipment on the products of an appreciable number of car manufacturers only about two years ago. At present more than a dozen makers furnish one or another of the various systems available, and it is highly probable that most of the others will follow suit for next year.

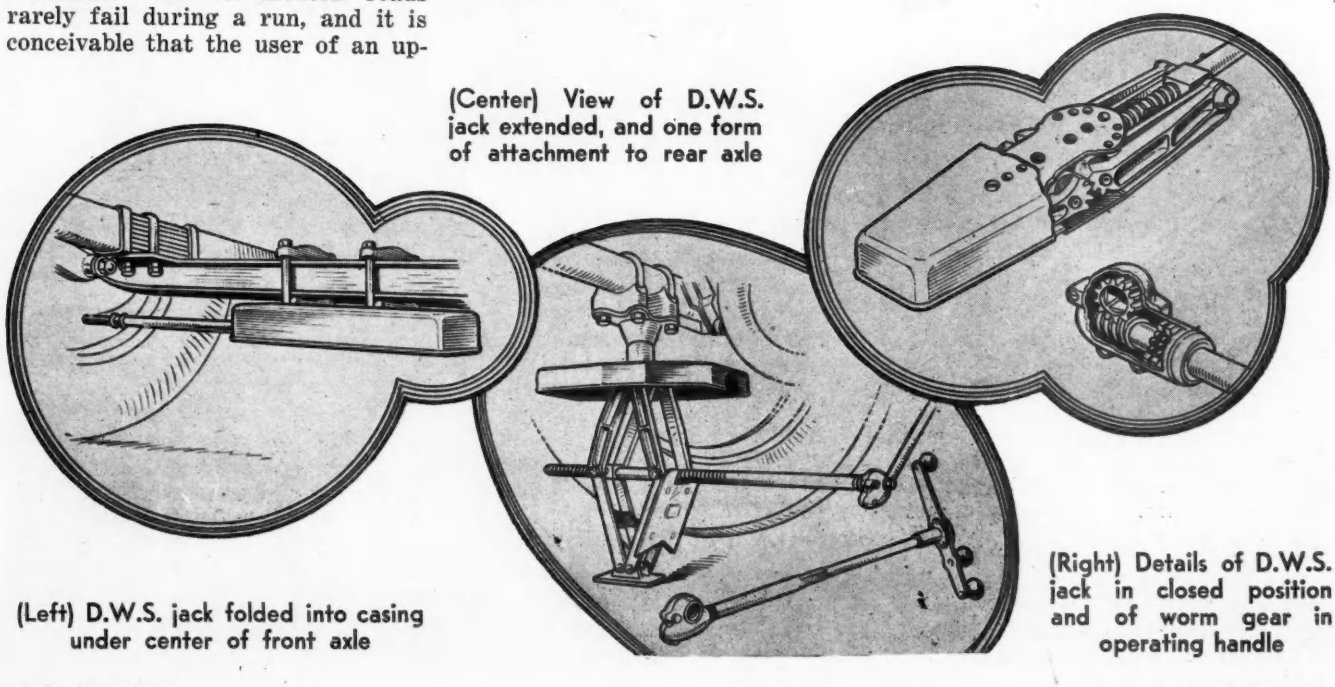
Among other reasons, the recent trend toward the provision of built-in ("permanent" or "integral") jacks is due to so many current body designs having extended rear panels that sweep down and behind the rear tank and render it extremely difficult to locate and use a "loose" jack, and to the fitting of an extensive front apron that often has the same ill effect as regards the jacking up of the front axle. These features of design, in conjunction with a very low chassis, have made it impossible in some cases to use a loose jack unless the operator lies at full length on the road or garage floor.

Modern tires on modern roads rarely fail during a run, and it is conceivable that the user of an up-to-date car with integral jacks may never have occasion to use the latter during the period of his ownership. But when tire trouble does occur, and especially at night, jacks already in position are coming to be regarded as essential here if the car owner is not to ruin his clothing and spoil his temper while raising the axle for a tire change.

No less important is the fact that, owing to the difficulty of access to the axles, permanently fitted jacks are held to be all but essential to the safety of the car; a loose jack has never been a sure support for a car minus a wheel, but nowadays, with the jack-pads so inaccessible, a jack may be insecurely located even though the operator take the greatest care.

Another point in favor of some examples of built-in jacks is the greater ease with which they can be operated, due to the facility with which the maker can provide a high ratio in the operating gear, and also to the more advantageous posture of the operator while manipulating the device.

While the use of jacks is ordinarily regarded as associated mainly with tire changes, many British owners liks to attend themselves to such upkeep operations as greasing, adjustment of brakes and cleaning—processes that often necessitate jacking up the wheels—and in Great Britain at least permanently fitted jacks will soon be regarded as essential as the loose jack has been in the past.



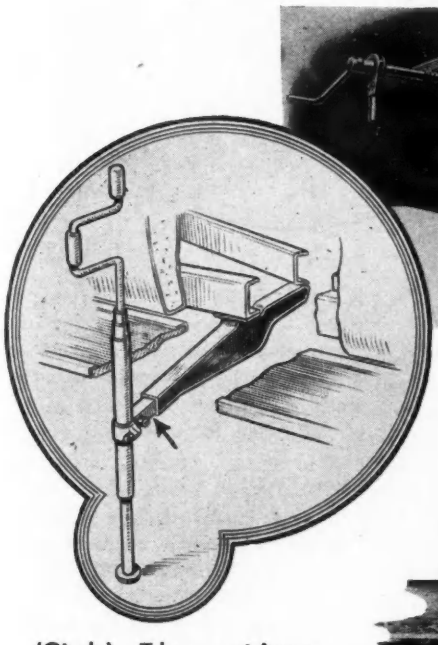
(Center) View of D.W.S. jack extended, and one form of attachment to rear axle

(Left) D.W.S. jack folded into casing under center of front axle

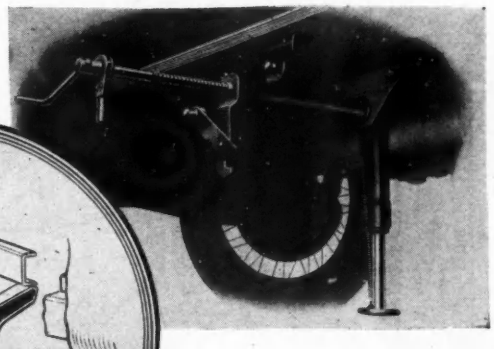
(Right) Details of D.W.S. jack in closed position and of worm gear in operating handle

by M. W. Bourdon
London Correspondent, Automotive Industries

Systems for 1935



(Circle) The outrigger type of Stevenson jack. One at each side lifts front and rear wheels simultaneously



(Top view) jacking system fitted to Triumph cars—Super Nine and "Twelve-Six" models

In this form of Stevenson system the "leg" lifts the chassis frame at mid length and is extended by rotating the horizontal shaft by means of a handle (not shown) that fits into the ratchet socket seen hanging down near the outer end. When leg is contracted, it is swung up horizontally under the chassis frame side by means of the short cranked "tommy bar" shown, and is secured there by the jawed arm seen depending at the center.

The simplest form of integral jack yet offered to British car manufacturers—though not yet adopted by a single one of them—is the A.R. It consists of nothing more than a cam-shaped leg hinged to each axle end normally held up by a cable. In its present form it is suitable for small cars only.

To raise a wheel, the free end of the leg is lowered to the ground and the car then pushed or driven until it "rides" on the leg, with the latter beyond dead center. In appearance the leg is similar to a brake shoe and has a rubber "tread" where the brake liner would be fitted, to give a higher coefficient of friction with the road surface than the bare steel stamping. To lower a rear wheel the car must be pushed a few inches, though a front wheel can be dropped by driving the car until the leg passes back over dead center. This scheme is quite effective so long as the car can be moved sufficiently to pass the dead center of the leg, but no mechanical means to this end has yet been devised to justify application of the system to large cars.

Next in order from the standpoint of simplicity is the Stevenson, which has been applied to certain models of two British cars, the Triumph and Humber, as well as to a number of Continental makes. It is used in two forms. In both there are two jacks, one on each side of the center of the car, each one acting directly on the chassis frame. Thus each jack raises the two wheels on one side simultaneously, but does so through the agency of the springs; this implies that the wheels do not leave the ground until the front and rear springs have extended to the limit. Beyond the fact that the whole of one side of the car, apart from the axles, must be lifted approximately twice as much as usual to raise the wheels from the ground, there are two objections to be raised against this scheme, one is that needless effort is called for when only one wheel is to be lifted—as when a tire fails—and the other is that it is impossible to lift all four wheels simultaneously, which is desirable when making brake adjustments.

One version of this scheme, illustrated here, has a detachable screw jack with a square-sectioned hinged arm for insertion in the end of an "outrigger," itself attached permanently to the chassis and passing under the running-board. The other arrangement comprises a screw jack attached by a hinge to a bracket under the side rail of the chassis; there is an operating shaft that extends under the running-board to a point where a detachable crank can be applied. Means are provided whereby the jack can be easily folded up and secured horizontally under the side rail.

By far the most extensively used in England is the D.W.S. system. It is standard equipment on all or some

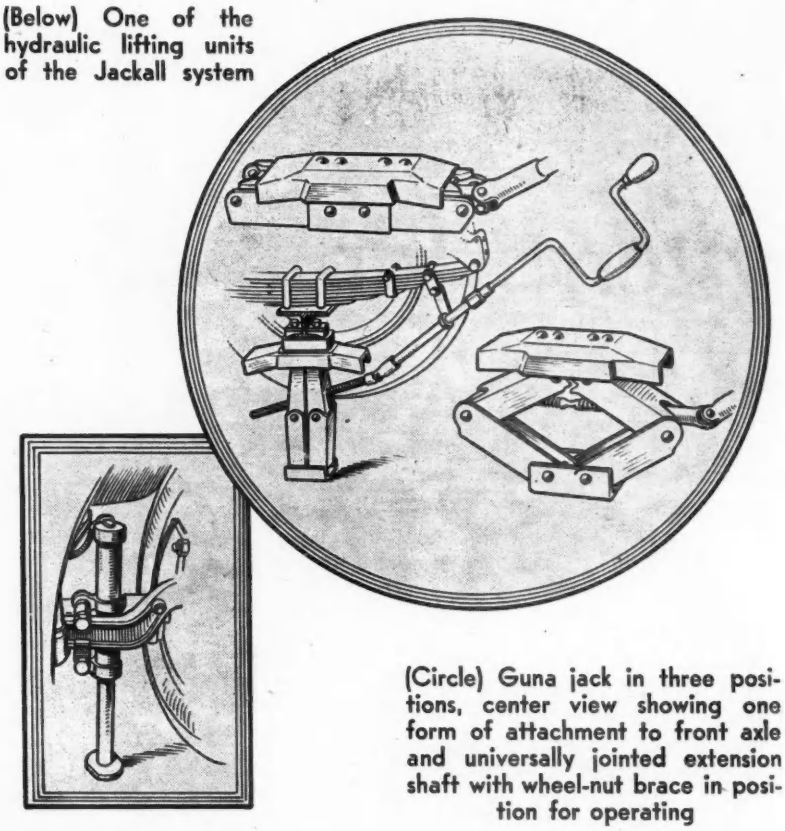
of the 1934 models of Rolls-Royce, Armstrong-Siddeley, Avon, S.S., Alvis, A.C., British Salmson, M.G., Standard, Humber and Triumph, while almost every maker is willing to fit it at an extra charge to models on which it is not standard. Its makers keep in stock jacks and attachment fittings suitable for 90 per cent of cars on the British market. Apart from the fact that a long, rather heavy and somewhat cumbersome detachable operating handle is an accompaniment for which storage space must be found on the car, the equipment seems to have everything in its favor. A set comprises three lifting units, one for attachment under the center of the front axle and two for the ends of the rear axle.

Each D.W.S. lifting unit consists of a casing, attached to the axle, normally inclosing four pairs of toggle members that can be extended downward to lift, or withdrawn upward to close, by the rotation of a right-and-left threaded shaft passing horizontally through threaded holes in the central hinge pins of the toggle members. The upper hinge pins locate the toggles in the casing and the lowest ones carry a "foot" for contact with the ground. When the unit is folded up, its casing is sealed by the "foot" and two plates attached to the lower two pairs of toggles. When folded, the threads of the shaft are also inclosed, only the plain part of the shaft with its squared end projecting.

The detachable operating handle has inclosed worm gear with a double-thrust ball race, the worm wheel having a square hole for engagement with the operating shaft. The end of the operating handle is T-shaped, with three knobs to afford a two-hand grip for lifting and a one-hand grip for quick lowering. The length of the handle is such as to enable the operator in some cases to stand upright; this applies mainly to the front axle jack, for in many instances the rear body design necessitates the threaded shaft projecting to a point where it can only be reached by passing the operating handle horizontally through the spokes of the wheel to be lifted. The threaded shaft could, of course, be extended as far back as required to make it accessible behind the car, but this is not usually done on account of the need for a steady rest to prevent excessive vibration of the shaft overhang.

Installation of the D.W.S. system is quite simple in most cases. The casing is generally clipped under the front axle center by two yokes and two pairs of bolts, while the rear jacks can be secured by the nuts of under-axle spring clips, or by U-bolts to the axle casing. Where the front axle center is lower than usual, a short outrigger bracket is used.

(Below) One of the hydraulic lifting units of the Jackall system



(Circle) Guna jack in three positions, center view showing one form of attachment to front axle and universally jointed extension shaft with wheel-nut brace in position for operating

As to costs, the extra charge where these jacks are not standard equipment ranges from £5 to £8 for three jacks, one operating handle and fitting.

A system much like the D.W.S. in principle is the Guna, the toggle members of which consist of four pressed steel units. In this case the right-and-left threaded shaft terminates close to the inner end of the inner thread and is coupled there by means of a universal joint to an extension shaft, intended to be carried to some accessible point and located by a bracket. The brace provided for the nuts of the bolted-on detachable wheels serves to rotate this extension shaft. Four jacks constitute a set, and the retail price for a medium sized car is £5 5s. in England. The Guna is not standard yet on any British car, but would appear to be a system well suited to low-priced production in quantity.

Another system, not yet standard on any British car, though fitted in its original form to Star cars (now out of production), is the Jackall, made by a prominent automobile accessory firm (S. Smith & Sons, Cricklewood, London). The Jackall equipment is hydraulically operated. The pump unit, with reservoir, can be located at any convenient point on the car; in some instances it has been fitted under the front floor, with a detachable operating lever; in other cases it has been fitted under a running-board. An accompaniment is a distributing valve unit by means of which the flow of the liquid from the pump can be directed through the essential pipe lines to lift (1) all four wheels at once, (2) the front wheels only, or (3) the rear wheels only. So far as operating convenience is concerned this system is commendable, but it is necessarily more costly than the mechanical equipments, retail prices ranging from about £12 to £16, according to the weight of the car. The actual jacks are of a simple plunger type, two for each axle adjacent to the wheels.

Another hydraulic equipment recently put forward is the Autojack, the pump of which is operated by the starting motor through a special drive.

Beyond the foregoing there are on the British market, or shortly will be, various mechanical systems embodying a loose jack with a permanently fitted anchorage of special design to which the jack can be easily attached and operated by an extension handle. An example of

(*Turn to page 117, please*)

Scene on Oldsmobile Six assembly line at the body station. Great care is taken to assure perfect alignment of body and chassis

PRODUCTION LINES

Moly Matrix

Add to your reading list — the Moly matrix—a little mailing piece dealing with short, snappy items on the treatment of irons and steels with molybdenum. If the first issue to reach our desk is any criterion, it's going to be of real value to engineers and metallurgists. Incidentally, the bulletin deals with facts and is not intended to put over a sales talk. Let's know if you want to get on the mailing list.

Very Neat

Mueller Electric of Cleveland has got hold of an excellent idea. They supply a kit of "balancing clips" marked with calibrated weights for use in the balancing of wheels, tires and rims. These clips are similar to the clips used on battery terminals, etc. After balancing the clip is replaced with a permanent weight of the right value, in the right place.

Value vs. Price

Lake City Malleable brings up a fundamental point. Under the codes, prices of malleable castings like other things are sometimes higher, but certainly more stabilized. The real question now is not PRICE but VALUE. Buy where you get the best service and best quality.

World's Latest

We have just received our personal copy of "Bulletin Citroen" describing the new Javel factory in which the 7, 8 10 and 15-hp. Citroen cars are being produced. It's just about the last word in mass production. And American methods have had the biggest hand in its conception. Some notes on this plant will appear in *Automotive Industries* soon. When you see the picture of the main assembly floor you will share our enthusiasm for the manner in which the job has been done. Spacious, high domed, well lighted and well painted, the plant shows what may be done to improve working conditions even where extra steps and lost motion are taboo.

Better Sheets

National Steel, Ford, Youngstown, Carnegie and Bethlehem all are installing continuous-sheet mills to produce better auto body sheets. Youngstown has ordered one costing $6,000,000. National's mill will have a capacity exceeding 680,000 tons per year and will cost $12,000,000. This mill will roll sheets 75 in. wide and process them further by cold rolling. This great program does not encroach on the NRA ban, since it does not increase steel ingot capacity.

Prices Upped

Petroleum Code shows how difficult it is to predict anything. Now it seems that fuel oil prices have been jacked up and the Oil Code Authority is going to investigate. In the meantime, if domestic fuel oil prices go up, it's quite likely to affect the cost of Diesel fuel, unless the oil people decide to protect the infant development. Of course there's nothing alarming in the situation because of the wide spread in price between Diesel fuel and gasoline (figuring the tax on gas). Nevertheless, Diesel equipment manufacturers and operators should watch the situation intently.

Job and Salary

"Salary Standardization and Administration," a new and comprehensive report from the Policyholders Service Bureau, proves that the level of salaries for different jobs as well as promotion, no longer are matters of individual taste but are susceptible of scientific treatment. The report is based upon a survey of practice and gives examples of job standardization, methods of setting salary levels, etc. While practice differs, as might be expected, the report points to possibility of working wonders in any organization. If interested in this phase of management, ask us for a copy of the report without charge.

Closed or Open

In following the activity of the A. F. of L. in the automotive industry, it is interesting to note the resentment against and "Open" shop on the part of labor organizers. The "open" shop is really closed to union workers, they say. But what of the "closed" shop? There seems to be nothing wrong with the idea of a closed shop, open only to holders of a union card. Seems to be a rather one-sided argument.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

The M. I. T. In

AN engine indicator which combines some of the good features of the Farnboro and the Bureau of Standards instruments has been developed at Massachusetts Institute of Technology and is known as the M.I.T.

The M.I.T. indicator comprises a pressure unit (Fig. 1) in which a thin steel diaphragm, 0.003 in. thick and of 3/8-in. effective diameter, is clamped with its circumferential portion between two perforated disks. These disks are dished on the side facing the diaphragm, so the latter has a certain freedom of motion in both directions from its neutral position, and when it is deflected by an excess of gaseous pressure on one side, it is supported on a series of circular ridges on the disk on the opposite side. The writer understands that this pressure element is practically identical with one developed at the N.A.C.A., and is interchangeable with it. The pressure element has an 18-mm. thread and screws into a corresponding spark-plug hole.

A 3/16-in. copper tube from a nitrogen pressure bottle communicates with the upper part of the diaphragm chamber, and by means of the valve on the bottle the pressure in this part of the chamber can be increased at will. A branch from the pressure line leads to the recording element, where the "recording arm" must be moved in proportion to the pressure acting on the diaphragm.

Assuming that a certain gaseous pressure is applied to the top of the diaphragm, the latter will rest on the lower supporting disk until the pressure in the cylinder, rising as a result of combustion therein, overcomes the so-called balancing pressure. Then the diaphragm is forced upward and, by contacting with the insulated contact pin centrally above it, closes an electrical circuit. In the the Farnboro indicator the electrical contact device directly controls the primary current of the spark coil, whose secondary current produces the spark that burns the series of holes in the indicator card which form the indicator diagram. One of the features of the M.I.T. indicator is such an arrangement of the electrical system that only a very small current has to be interrupted by this contact device, so that there is little danger of burning the contact points; another is the use of an air-core spark coil, which has a smaller time constant than the iron-core coil and causes less time lag.

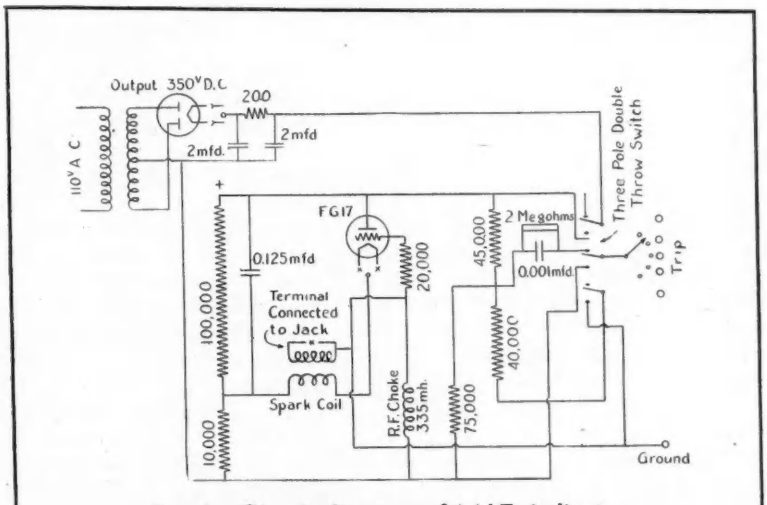


Fig. 3—Circuit diagram of M.I.T. indicator

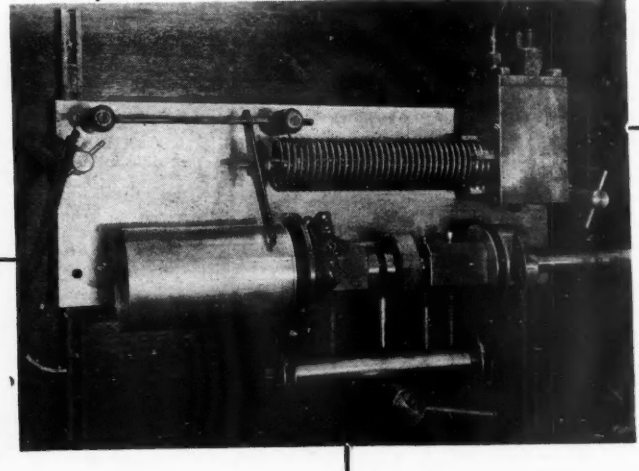


Fig. 2—Recording element of M.I.T. indicator

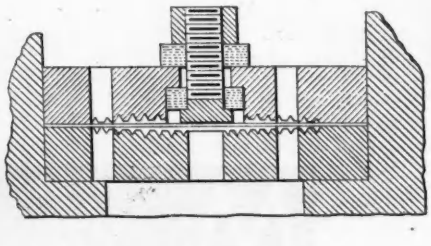


Fig. 1—Pressure element of M.I.T. indicator in section

by P. M. Heldt
Engineering Editor, Automotive Industries

Indicator

The fifth of a series of articles discussing developments in the field of engine indicators

A photograph of the recording element in its latest form is reproduced in Fig. 2. In the upper right-hand corner may be seen a pressure chamber to which connection from the nitrogen bottle is made by a tube. From this pressure chamber extends a cylinder containing a plunger, which latter carries the recording arm directly. From the binding post in the upper left-hand corner of the mounting panel, electrical connection is made to the secondary terminal of the spark coil. From this binding post the current is carried to the point of the recording arm by the horizontal bar near the top of the panel and a wire on top of the recording arm which slides in contact with the horizontal bar.

The spark point of the recording arm is in proximity to a grounded metallic cylindrical shell—the drum. This drum is driven directly from the engine crankshaft through a positive clutch. One of the latest improvements made in the instrument is in this drive. In addition to having a direct drive through a positive clutch, the drum is driven also through a pair of belts, and the pulleys of this belt drive are so proportioned that they give the drum a speed slightly higher than that of the crankshaft. When it is desired to place the drum in driving connection with the crankshaft, the belts are tightened by moving the shafts farther apart. This greatly facilitates engagement of the positive clutch, by means of the knurled collar shown in the photo. The belt drive remains engaged while a diagram is being taken, which has the advantage that it automatically takes up any backlash there may be in the drive. It will be noticed that the mounting panel is adjustable vertically on the ways.

In the latest model of this indicator, "phasing" or recording of the dead-center point on the indicator card is accomplished by means of a movable contact on the drum, which is arranged to actuate the tripping circuit; that is, the circuit containing the relay through which the spark coil is energized. A neon stroboscope operated by the tripping circuit is used to illuminate the timing mark on the flywheel and the dead-center index alongside of the flywheel. The contact alongside the drum can be adjusted angularly; by adjusting it until the stroboscope shows the top center mark opposite the index, the top-center position for the adjustable contact is found, and the dead-center line can then be inscribed on the card by moving the recording arm along the drum by changing the balancing pressure.

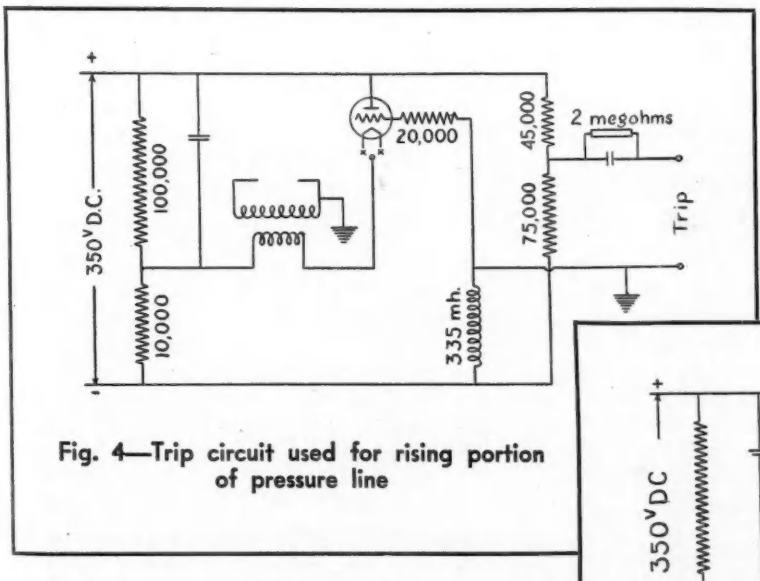


Fig. 4—Trip circuit used for rising portion of pressure line

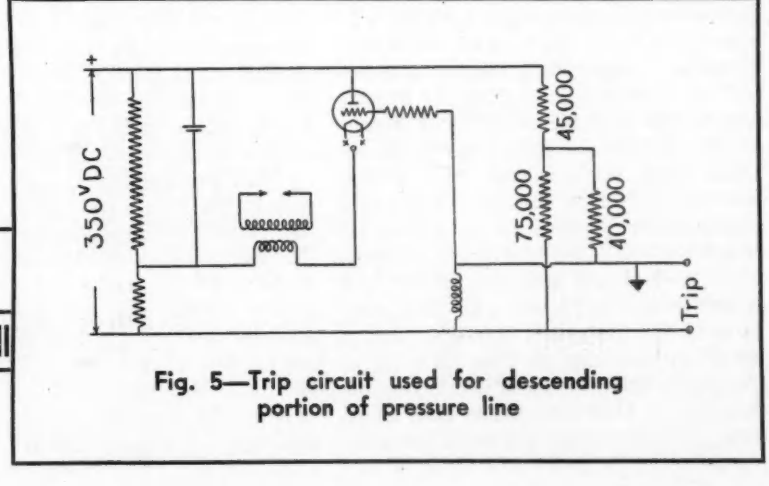


Fig. 5—Trip circuit used for descending portion of pressure line

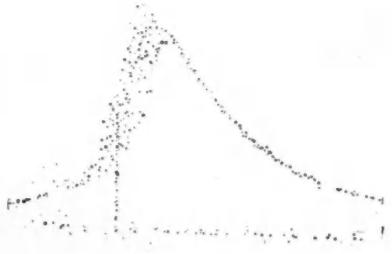


Fig. 7—Diagram taken with indicator from N.A.C.A. engine with compression ratio of 5

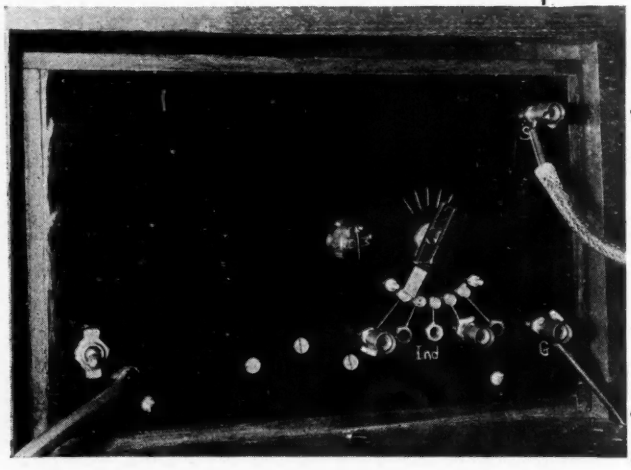


Fig. 6 — Control panel of indicator

To take a diagram, a sheet of carbon paper is wrapped around the drum and is held in place by a rubber band at each end. The recording lever is swung into position and the clutch engaged in the manner described, which causes the drum to revolve. The electrical circuit is then closed by means of the triple-pole switch. By then opening the valve in the line from the nitrogen bottle slowly, the balancing pressure is gradually increased. As long as this pressure is less than the maximum cylinder pressure, the diaphragm changes its position twice during each engine cycle, once as the cylinder pressure rises beyond the balancing pressure, during the combustion period, and again when the cylinder pressure drops below the balancing pressure, during the expansion period. When the cylinder pressure increases beyond the balancing pressure the electric circuit is closed, and when it drops below the balancing pressure the circuit is broken. Recording the breaking of the circuit calls for a somewhat different electrical hook-up than that required to record the making of the circuit, and this change-over is effected by means of the three-pole, double-throw switch.

To reduce the amount of current which must be handled by the contact of the pressure element, use is made of a relay in the form of a thyratron tube—a gas-filled tube containing a filament, plate and grid. The grid normally prevents current flow through the tube from plate to filament when the latter are subjected to a difference of potential, and a current can be started only by applying an intermediate potential to the grid, so that it has a positive bias with relation to the filament.

A circuit diagram of the electrical unit of the M.I.T. indicator is shown in Fig. 3. The transformer, tube, condensers and resistance shown in the upper left-hand corner serve the purpose of obtaining a steady potential difference of 350 volts from an alternating current line of 110 volts. The tube acts as an electronic valve which lets only one wave of the alternating cycle pass, but by providing a double secondary winding in the transformer and two plates in the tube, both waves are transmitted through the tube, and the ripple due to the rise and fall of the voltage in the alternating circuit is eliminated by means of the 2-microfarad condensers and the 200-ohm resistance. This assembly constitutes a full-wave rectifier and filter, a device well known in the radio industry.

With resistances of 100,000 ohms and 10,000 ohms in series, there evidently will be a voltage drop of about 320 volts across the 100,000 ohms resistor and 30 volts across that of 10,000 ohms, and the condenser in parallel with the larger resistor will be charged to 320 volts. This voltage is impressed upon the circuit comprising the primary of the spark coil and the thyratron tube. With no current flowing through the tube, the filament evidently is about 30 volts positive with relation to the negative terminal.

At the right in the diagram there are shown a number of resistances which can be connected to form a bridge across the 350-volt line, and the connections can be changed in various ways by means of the three-pole switch and the pressure element.

While the pressure in the cylinder is rising, the pressure element "makes" a circuit, and vice versa. Different hook-ups are required for the two cases, and the change-over from one to the other is effected by means of the three-pole switch. The two hook-ups are shown in Figs. 4 and 5 respectively.

Referring to Fig. 4, which shows the circuit used for "make" or closing of the trip circuit, used to record the rising portion of the pressure line, it will be seen that the grid is connected to the negative side of the line through a 20,000-ohm resistance and a 335 milli-henry inductance, so that it is normally at the potential of the negative side of the line and therefore negative with respect to the filament.

If now the trip contacts are closed by the pressure element, the grid is connected to the junction between the 45,000-ohm and 75,000-ohm resistors, which raises its potential by about 200 volts, giving it a 170-volt positive bias with relation to the filament. This starts current flowing through the thyratron and the primary circuit of the spark coil. At the same time a current impulse is induced in the secondary winding of the coil, which is discharged across the gap between the spark point and the drum, leaving a mark on the indicator card or paper.

In Fig. 5, which shows the hook-up used for the descending portion of the pressure line, the trip contacts are normally closed and the grid is at the potential of the negative side

of the 350-volt line, being connected to that side through the pressure-element contacts. If now the trip contacts are opened by the pressure element, the grid is connected to the junction point of the 45,000-ohm and the 75,000-ohm resistors, and its potential is thereby raised 200 volts, or 170 volts above that of the filament. This again brings about the discharge of the condenser through the tube and the making of a mark on the record paper.

The thyratron tube has the desirable feature that the grid has no control over the current once the latter has been established, and cessation of current flow can be brought about only by reducing the applied voltage to zero. Since the primary of the spark coil and the condenser connected to it form a resonant circuit, the discharge of the condenser through the coil and tube tends to be oscillating, hence the voltage impressed on the tube drops to zero and the current stops after a single surge.

Fig. 6 shows the switchboard of the electrical element of the indicator. The switch in the lower left-hand corner serves to connect the element to the 110-volt house circuit, and to disconnect it therefrom. In the lower right-hand corner is the binding post for the ground connection, and in the upper right-hand corner the binding post for connection to the pressure element. The knob at the center of the panel controls the three-pole, double-throw switch, while adjacent to it at the right is seen the selector switch by which the tripping circuit is connected to any one of a number of pressure elements or to the phasing contact on the recording drum.

By sending the phasing current first directly through the primary of the spark coil and then through the tripping circuit, it was shown that the latter introduces no measurable time lag.

Fig. 7 shows a diagram taken with this instrument from an N.A.C.A. engine having a compression ratio of 5.

The writer understands that the instrument as at present constructed requires no special knowledge or delicate adjustments and that it has been used by untrained operators with satisfactory results.

Spectral-Line Reversal Method Used in Combustion Chamber Measurements

ONE of the most difficult measurements in connection with internal combustion engines is undoubtedly that of the maximum temperature attained in the combustion chamber. The usual means of temperature measurement, such as thermo-couples, are inapplicable, because of the infinitely short time the maximum temperature persists and the finite heat capacity of the couple. To obtain instantaneous values of the temperature, a thermometric substance must be distributed through the region for which the temperature is desired, and must have a heat capacity which is negligible as compared with that of the working substance. The substance must be easily vaporized. Its temperature can then be found by comparing its brightness at any given wave length with that of a continuous radiator whose brightness temperature at that wave length is known. The amount of vapor present must be sufficient to radiate and absorb light according to Kirhhoff's law, and this condition can be met with extremely small quantities of vapor if comparison is made at a wave length corresponding to some resonance radiation of the vapor. Tests have shown that under these conditions the thermometric substance has a negligible effect on the flame temperature.

This method of temperature measurement, known as the line-reversal method, has been used extensively for measuring the temperature of flames. It has been applied to the measurement of the temperatures within internal combustion engine cylinders by Albert E. Hershey and Robert F. Paton of the Engineering Experiment Station of the University of Illinois. The tests made by them are described in detail in Bulletin No. 262 of the Engineering Experiment Station, Urbana, Ill., entitled "Flame Temperatures in an Internal Combustion Engine Measured by Spectral-Line Reversal."

Application of Method

In applying the method to the measurement of internal combustion-engine temperatures, sodium hydrate solution is fed to the combustion chamber through a glass aspirator secured into the wall of the inlet passage at the elbow just above the carburetor. The cylinder is provided with quartz windows on opposite sides near its top. On one side of the cylinder in line with the windows is placed a lamp with a tungsten ribbon filament. Lenses are placed in front of the windows on both sides of the cylinder, the lamp filament being placed at the principal focus of the first lens and the slit of the spectroscope at the principal focus of the second. Between the second lens and the cylinder is placed a stroboscopic shutter.

At Urbana the measurements were made on a single-cylinder farm-lighting set engine in which the air-cooled cylinder had been replaced by a water-cooled cylinder with a compression ratio of 3.86. The maximum temperatures of combustion were measured for various fuel-mixture ratios. A comparison was made of the temperatures thus measured with temperatures computed on the basis of combustion formula, considering the effect of residual gases, variable specific heats and dissociation, but neglecting heat loss. The effect of spark timing on the maximum combustion temperature was also investigated.

The maximum flame temperature in this engine (compression ratio of 3.86) was found to vary from 3290 deg. F. for the richest and leanest mixtures to 3990 deg. F. for a fuel-mixture ratio of 13.9. The maximum observed flame temperatures and the corresponding calculated temperatures were in closest agreement for the normal operating mixtures ranging between 12 to 1 and 14 to 1. Throughout this range the calculated values were approximately 600 deg. higher than the observed values.

Wholesale and Retail Financing Reaches New Peaks in May

(Summary for 282 Identical Organizations Reporting to Census Bureau)

	May, 1934	April, 1934	May, 1933	Five Months, 1934	Five Months, 1933
Wholesale Financing	$123,691,003	$121,060,526	$55,005,590	$444,920,456	$181,201,003
Retail Financing	99,591,058	87,998,227	58,192,786	336,606,849	197,545,267
New Car Volume	67,991,000	59,772,079	37,475,257	222,670,779	120,334,727
New Car Units	122,155	107,925	75,025	401,578	237,080
New Car Average Note	557	554	500	554	508
Used Car Volume	29,763,110	26,694,463	19,428,060	107,443,416	72,768,971
Used Car Units	132,072	119,542	89,260	480,496	330,182
Used Car Average Note	225	223	218	224	220
Unclassified Volume	1,836,948	1,531,685	1,289,471	6,492,654	4,441,569
Unclassified Units	4,893	4,268	4,043	18,554	14,205

Available Butane Could Fill 20 Per Cent of Motor Fuel Needs

THERE is enough butane available to constitute 20 per cent of the motor-fuel supply, as compared with a present-day average content of about 6 per cent, according to R. C. Alden of the Phillips Petroleum Co., who read a paper entitled "Butane—A Wasted Asset of the Petroleum Industry" before the American Petroleum Institute at its recent meeting in Pittsburgh. With the advent of cracking, large quantities of crude oil have been converted to butane synthetically. The amounts of synthetic butane are so large that modern refineries have much more available than can be incorporated in finished motor fuels. The natural-gasoline industry is in dire distress because of the depressing effect of this excess butane on its market.

Mr. Alden's proposed remedies for the situation are as follows: Blend as much fuel as possible in conventional motor fuels. The first step in this direction is for refiners to crowd prevailing seasonal maximum Reid vapor-pressure specifications. The second step is to enlist the automobile industry whole-heartedly in a campaign to eliminate the poor plumbing that makes a few models very bad vapor lockers. The maximum permissible butane content of motor fuels, he says, should be limited by evaporation and quality losses, rather than by the poor design of the fuel system in a few models.

Mr. Alden is rather outspoken in his criticism of the automobile industry for its failure to remedy the vapor-locking situation. He says:

"For five years the automotive and petroleum industries have fostered a cooperative investigation of the vapor-lock problem. The investigation has been cooperative, but there the cooperation has ended. Although it has been known for several years how to design fuel systems for automobiles so vapor lock would be impossible, each crop of new models has shown the same tendency to vapor lock. *There has been no improvement in the cars.* Is this cooperation? It is time for the petroleum industry to place the blame for vapor lock squarely where it belongs—on the offending cars."

Ice Formation in Aircraft Carburetors

Two series of experiments have been carried out at the Bureau of Standards to establish a correlation between the volatility of aviation and the formation of ice in carburetors. One series was on a small-scale, and there was no external heating of the carburetor; in the other series of full-scale tests an aviatior engine was operated in the altitude laboratory of the Bureau.

Charts showing the results of this work have been prepared, including a chart indicating the danger zone of ice formation with respect to atmospheric conditions. Since ice in carburetors is believed to have been responsible for some otherwise mysterious airplane accidents, this chart should prove an aid to safety.

Western Auto Budgets 36% for Gross Profit

THE table which follows shows the 1933 operating results and the 1934 budget of the Western Auto Supply Co., operator of a large chain of retail automotive accessory and supply stores, as presented in the Executives' Service Bulletin of the Metropolitan Life Insurance Co. by Lester Hutchings, Western Auto's comptroller.

It is presented here for the light it throws on the operating ratios of chain operated automotive supply stores.

	%	Results 1933	Budget 1934	%
Sales	...	$12,000,000	$15,000,000	...
Cost of Sales	66.6	8,000,000	9,500,000	63.3
Gross Profit	33.3	$4,000,000	$5,500,000	36.0
Expenses:				
Advertising	5.0	$600,000	$750,000	5.0
Rent	5.0	600,000	750,000	5.0
Salaries	10.0	1,200,000	1,800,000	12.0
Miscellaneous	7.0	840,000	1,200,000	8.0
Total	27.0	$3;240,000	$4,500,000	30.0
Net Profit	6.3	$760,000	$1,000,000	6.7

Fuel Injection Pump Leakage Varies as the Cube of the Plunger Clearance

A STUDY of the subject of leakage in fuel injection pumps has been made for the National Advisory Committee for Aeronautics and is dealt with in N.A.C.A. Report No. 477, "Effect of Viscosity on Fuel Leakage Between Lapped Plungers and Sleeves and on the Discharge from a Pump-Injection System," by A. M. Rothrock and E. T. Marsh.

Hydraulic injection systems for Diesel or spark-ignition engines generally employ a lapped plunger moving in a sleeve to create the necessary hydraulic pressure for injecting the fuel into the combustion chamber. With application of fuel injection to gasoline engines the range of viscosities of fuels handled in fuel-injection systems has been materially increased. Consequently it became desirable to know the effect of fuel viscosity, clearance between plunger and sleeve, and length of lapped surface on the leakage of fuel in the system.

Leakage may be objectionable because it represents a loss of fuel, results in uneven distribution to different cylinders, dilutes the oil in the camshaft case of the pump and interferes with its lubrication, and may necessitate the installation of a return tube from the injection valve to the fuel tank to prevent the fuel from wetting the engine.

The investigation of the N.A.C.A., which covered the effect of fuel viscosity and plunger and sleeve dimensions on the leakage between lapped plungers and sleeves, is a part of the general investigation of fuel-injection systems that is being conducted by the committee. Data on the effect of fuel viscosity on the rate of fuel discharge from a fuel injection system were also obtained.

The following conclusions were drawn from the results of the tests made:

The rate of leakage between a lapped plunger and sleeve varies directly as the density of the fuel, the pressure producing the leakage, the diameter of the plunger, and as the cube of the mean clearance between plunger and sleeve. The rate of leakage varies inversely as the length of the lapped fit and inversely as the viscosity of the liquid in absolute units. Because of these relationships, the length of the lapped fit is of minor importance compared to the clearance.

With a pump injection system the leakage past the plunger is approximately 0.2 to 0.01 per cent—depending on the viscosity—of the fuel injected, provided the clearance is not greater than 0.0001 in.

In general, the length of lapped fit necessary for a lapped plunger and sleeve is from three to five times the plunger diameter.

The rate of leakage is increased considerably under pressure unless the walls of the sleeve are sufficiently thick and the diameter of the plunger is sufficiently small to make the expansion of the former and the contraction of the latter negligible in comparison with the clearance.

The rate of leakage can be made to decrease with increased pressure either by making the plunger hollow so the pressure increases the plunger diameter, or by maintaining pressure on the outside of the sleeve so that under pressure the actual clearance is decreased, or both.

The quantity of fuel that leaks past the injection valve stem when an automatic injection valve is employed is insufficient to affect the fuel consumption of the engine, but it is sufficient to wet the engine if non-volatiles such as fuel oil are used.

Present-day commercial fuel-injection pumps will operate satisfactorily on fuels ranging in viscosity from 0.0042 to 3.00 poises, provided the fuel is supplied to the pump under sufficient pressure to fill the receiving volume.

The effects of the above range of viscosities on the mass rates of fuel discharge of the injection system are negligible.

There is a slight variation in the rates of fuel discharge for fuels of different densities, the denser fuels showing the higher rates.

Henschel Regulator Improves Torque at Both Ends of Diesel Speed Range

AN improvement in fuel injection systems for Diesel engines which makes it possible to raise the maximum engine torque at both ends of the speed range has been introduced in Germany under the name of Henschel mean-pressure regulating system and can be combined with Bosch injection pumps.

As the speed of the engine increases the amount of air passed by it in unit time increases less rapidly, owing to the decrease in volumetric efficiency. The amount of fuel passed by the injection pump, on the other hand, increases in substantially direct proportion to the speed. Therefore, if the fuel quantity were adjusted so it would be correct (maximum possible torque without smoke) for low speed, the amount of fuel injected at high speed would be too great. Inversely, if the pump were adjusted for the correct amount of fuel at high speed, the amount at low speed would be too small.

In the Henschel hydrodynamic control system by-pass valves are placed in the individual pressure lines from the pump, as close to the delivery valves of the pump as possible. These are spring-loaded needle valves. At low engine speeds the pressure in the injection lines is comparatively low and the by-pass valves do not open, hence the pump can be adjusted to deliver all of the fuel that can be burned in the engine with smokeless exhaust under these conditions. As the engine speed and therefore the pressure of injection increases, the by-pass valves open and allow a part of the fuel moved by the pump to be by-passed, the more the higher the engine speed. Thus there is no danger of too much fuel being injected at high speed. The fuel by-passed by the various valves is collected in a

(*Turn to page 120, please*)

Pressure Studies P
Air Resistance and B

WHEN it is desired to study the distribution of air pressure over the outside of the body, the scale model is made hollow and provided with a series of 25/32-in. holes on lines *1*, *2*, *3*, *4* and *A*, *B*, *C* (Fig. 1). These holes are closed by tight-fitting plugs. The interior of the scale model communicates with a pressure gage of high sensitivity. The test is made with interaction (by which the author evidently means that two scale models are placed in the throat of the wind tunnel, wheel to wheel). Results of such a test are plotted in Fig. 1.

If one of the plugs is removed the pressure within the model becomes equal to that on the outside of the model where the plug was located. The tests plotted in Fig. 1 were made with an air velocity of 20 meters per second (45 m.p.h.). The velocity of the wind at a considerable distance is represented by the length *MN*, this value being obtained from the excess pressure above atmospheric on the front of the radiator at the neutral point. Instead of the usual open radiator, the scale model has a solid frontal surface.

It is easy to pass from the scale model results to the actual case by composing the elements represented by the solid face and the permeable radiator on the one hand and the vehicle on the other hand, which is characterized by the permeability of the radiator and vehicle (inlet to and outlet from engine compartment).

In the diagram, super-atmospheric pressures on the surface of the car are represented by vectors drawn perpendicularly to the outline of the car within the latter, while sub-atmospheric pressures are represented by similar vectors on the outside of the car. From these pressure data it is possible to determine the relative wind (relative to the car) at any point of the body, or, rather, the mean relative wind for any zone.

At the neutral point the relative wind is zero. The wind, which blows at a definite velocity at a certain distance from the model, is stopped by the model at this point and then produces a static head

$$H = V^2/2g$$

If the pressure decreases the relative wind is defined by

$$V_r^2/2g = (H - h),$$

where h is the pressure at the point under consideration.

At the point where h is zero, that is, where there is neither over-pressure nor vacuum, the relative wind is equal to the wind at a distance from the model.

If h is negative, the relative wind is greater than the wind at a distance from the model.

If the ratio h/H is represented by a, then

$$V_r^2/2g = H\,(1 - a).$$

It follows that

$$V_r = V\sqrt{(1 - a)} \ldots\ldots\ldots \quad (3)$$

When there is a partial vacuum, a is negative. For instance, directly above the radiator shell $a = -1.63$, and there

$$V_r = V\sqrt{2.63} = 1.62\,V.$$

If V is 45 m.p.h., $V_r = 73$ m.p.h.

By means of equation (3) the

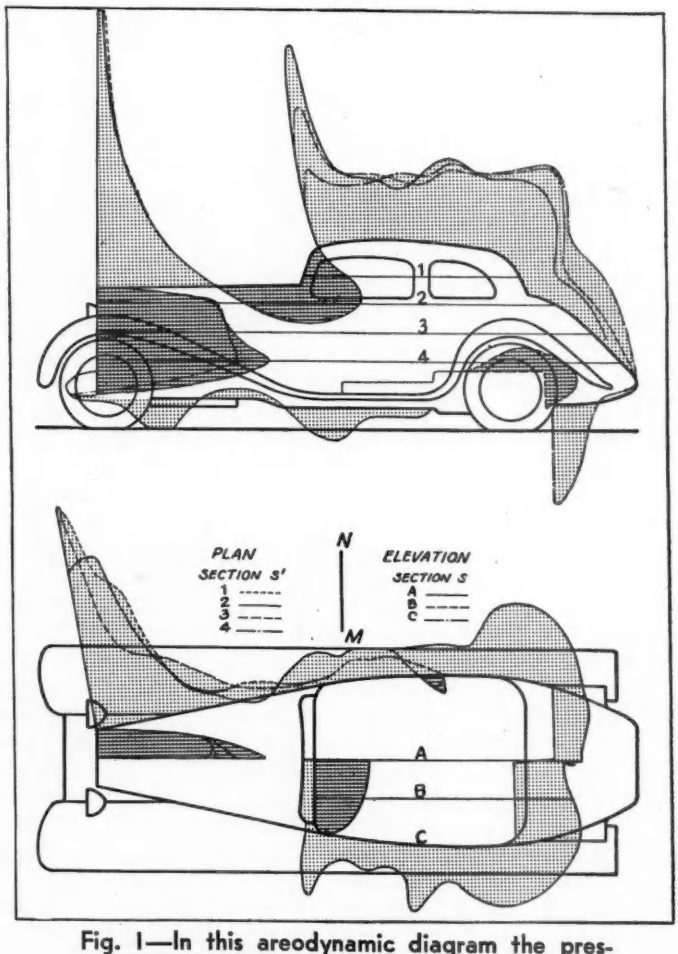


Fig. 1—In this areodynamic diagram the pressures on the body are plotted perpendicular to the surfaces. Super-atmospheric pressures (heavy shading) are plotted on the inside, subatmospheric pressures (light shading) on the outside

Point Way to Reduced Better Ventilation

Part II of paper presented by M. Andreau before the French Society of Automobile Engineers. The concluding instalment will appear in an early issue

wind at any given point can be readily calculated. It is thus found that the headlamps are in a wind which is nearly 40 per cent stronger than the wind in the tunnel at a distance from the model. This results in a total resistance which is substantially twice as great as that encountered if the lamps were exposed to a wind velocity equal to the car speed. Their air-resistance coefficient being of the order of 0.00345, as compared with 0.00308 for a disk and 0.00212 for the car, they have the same effect as if their projected area were 3.25 times as great as it actually is. This evidently explains—at least in part—the effect of the headlamps on the air resistance of the complete car, which is out of proportion to their dimensions.

The car is surrounded for the most part by a partial vacuum. Positive pressures of any consequence act only on the radiator, the windshield, the forward surface of the rear fenders, and the rear upper part of the hood. The forward side of the rear-mounted fuel tank is subjected to pressure which retards the forward motion. This helps to explain the favorable effect of a continuous underpan. A slight over-pressure exists also below the running board in the vicinity where ordinarily a part of the air escapes from under the hood.

The change in the direction of the air pressure at the rear end of the hood and on the windshield, due to the stationary swirl at this point, is quite plainly visible. At the rear the vacuum diminishes abruptly beyond the attached swirl. The latter, therefore, has a certain propulsive effect, which goes to explain the relatively small importance of the rear end of the body on the air resistance of the whole car.

Ventilation.—It is directly evident that, since there is a partial vacuum over the greater part of the outside surface of the body, leaks of all kinds—through the floor, between the door frames and doors, etc.—result in creating a partial vacuum in the body. Normal atmospheric pressure is restored by leakage elsewhere, at points where there is an over-pressure on the outside, mainly through the toe-boards and cowl. This results in circulation of air from under the hood through the body. The best method of ventilation therefore consists in

1. Hermetically closing all of the holes in the dashboard, toe-board and floor.
2. Providing adequate ventilating openings for pure air at points where there is an over-pressure outside the body.

What is required is that the entry of pure air under pressure exceed the loss of air from the body through leaks to points on the outside where there is a partial vacuum. If this relation is maintained there will be a slight over-pressure inside the body, which tends to keep out heat, fumes and unpleasant odors.

A study of the aerodynamic diagram furnishes an interesting check on the air currents determined and the resistances measured. It is a valuable qualitative check. In addition, it aids in problems of ventilation, since it furnishes exact data which could not be arrived at in advance by any known means; hence it is a powerful aid in seeking to increase passenger comfort and improve the cooling of the powerplant.

Built-In Jacking Systems

(*Continued from page 108*)

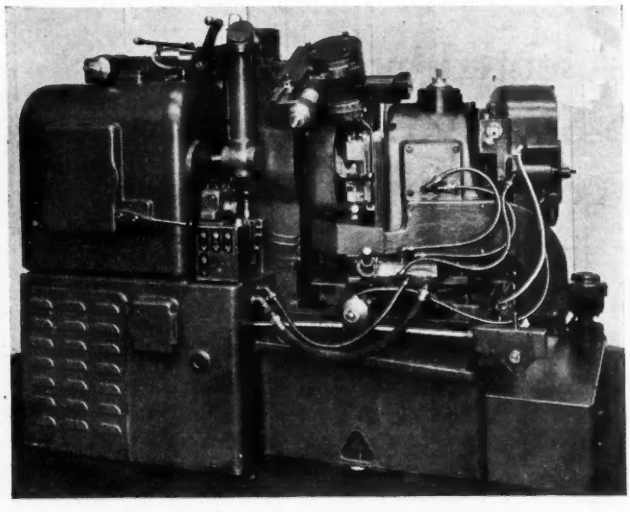
this type is of French origin, the Marchal; another is the Oto, but neither can be classified as a built-in or integral jacking system, the only advantage over the orthodox loose jack being that the jack itself, of a special type, can be correctly located with greater ease and certainty. Rover cars for 1934 have a simple version of this general idea; it consists of an ordinary jack with a double-hook head in place of a flat abutment plate, and under each axle is an inverted T-shaped bracket to which the jack head is hooked, hanging there until the operating handle is rotated, first to bring the jack foot to the ground and then to commence lifting.

Inadvertently Omitted

The interesting die cast window and regulator frame pictured on page 19 of our July 7 issue is used in Hudson and Terraplane cars. This point was inadvertently omitted in writing the caption for this illustration.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools



Gleason No. 14 spiral bevel gear grinder

Grinding Spiral Bevel and Hypoid Gears

The No. 14 Spiral Bevel Gear Grinder recently announced by Gleason Works, Rochester, N. Y., is said to solve the problem of correcting the deformations which occur in heat-treating spiral bevel and hypoid gears. It permits the teeth of any gear (not pinions) within its capacity to the close limits found possible with grinding.

The tooth surfaces are ground with a flaring cup wheel. The use of this type of wheel is said to have advanced the art of grinding spiral bevel and hypoid gears to the point where it is now possible to grind them faster than it is possible to finish cut them. This wheel is carried from end to end by an oscillating motion to grind the teeth for their full length.

In the grinding operation the gear is held stationary and the wheel is fed into the gear until the full depth position is reached. The wheel is then withdrawn and the gear indexed. Alternate grinding and indexing proceeds until all the teeth have been ground. Then the machine is stopped automatically. Separate feed cams are provided for rough and finish grinding. The movement of a lever by hand shifts the cams from roughing to finishing positions.

This machine is automatically stopped after the last tooth space has been ground, and a tell-tale light then notifies the operator that the machine is at the proper point in its cycle for dressing the wheel. The wheel spindle is swung up into dressing position by moving a control lever.

Motor-Driven Cylindrical Grinder

A 16-in. type C cylindrical grinding machine has just been announced by Norton Company, Worcester, Mass. In general design it is similar to the 10-in. type C line announced last December, although considerably larger and heavier in every detail.

It is offered as a motor-driven machine only, the grinding wheel spindle being driven by an individual motor mounted directly on the wheel-slide. Likewise, the headstock is driven from an adjustable-speed, direct current motor mounted on the unit, while a third motor drives the pumps and table traversing mechanisms.

The machine will swing 16½ in. over the table and mounts either a 30-in. or 36-in.-diameter grinding wheel. It is built in lengths of 36 in., 48 in., 72 in., 96 in., 120 in., 144 in., 168 in., and 192 in., and is offered either with hydraulic table traverse or mechanical traverse. If desired it can also be supplied as a hand traverse machine.

The machine weighs, complete with motors, approximately 13,000 lb. for the 36-in. length and 26,000 lb. for the 192-in. length. It requires a floor space from about 7½ ft. in width (8½ ft. when a hydraulic wheel head traverse mechanism is supplied) by lengths ranging from 12 ft. for the shortest machine to 38 ft. for the longest.

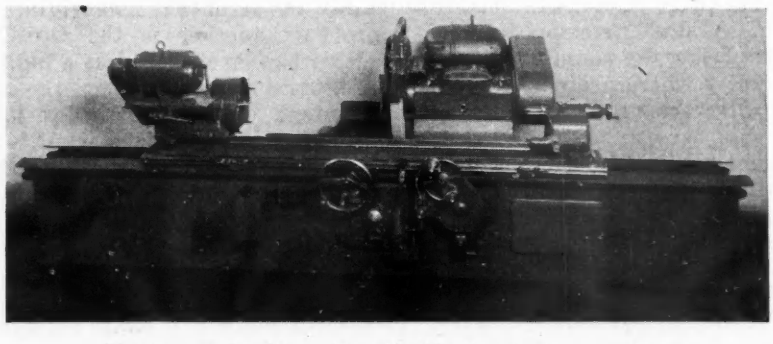
Self-Contained Plastic Molding Press

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has recently developed a new line of molding presses with individual electric motor drive, through the patented H-P-M "Dual-Speed" hydropower transmission. Each press is compactly self-contained with press cylinder and control valve equipment enclosed within a pedestal, which also contains the supply of operating oil.

The outstanding feature of the press is the system of controls. These not only provide adjustable automatic pressure control, but also regulation of speed of ram movements and an entirely new patented control principle, especially developed by H-P-M for plastic molding, whereby the rate of pressure increase is automatically governed according to predetermined adjustment.

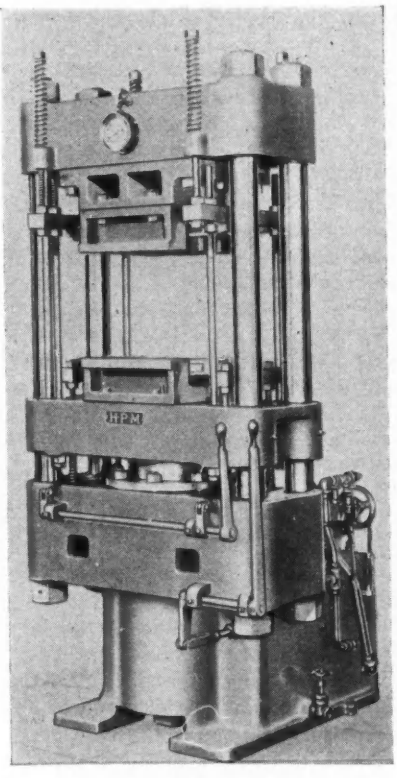
The press is arranged for rapid closing of the molds as a means of saving time. However, the speed of both closing and opening ram movements is controlled independently of the rate of pressure application.

The molding press, illustrated, is fitted with bolsters and power ejectors to operate semi-automatic, multiple cavity



Norton 16-in. Type C cylindrical grinding machine

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools



H-P-M Molding Press

chambered molds with knockouts. This type is available in six standard sizes ranging from 50 to 300 tons pressure capacity.

Light Weight But Powerful

Chicago Pneumatic Tool Co., New York, N. Y., has brought out two new Hicycle electric tools for use in body plants and other light assembly operations. The No. 00N electric nut runner is used for nut driving and screw driving with a capacity of No. 12 to 14 screws and 3/16 to ¼-in. nut. The No. 14 and 15 electric drill has a capacity of 3/16-in. diameter drill and ranges in speed from 2000 to 2800 r.p.m.

Both tools are of light-weight construction and of compact size, in accordance with the requirements of the process. The nut runner has a pistol grip and is available with a standard clutch (rotating or non-rotating) or with a special non-rotating bell-mouth clutch which spots the screw-slot automatically.

The nut runner weighs 8½ lb. and is 14¼ in. in length; the drill weighs 4¾ lb. and its length ranges from 11 to 11½ in.

Welder Driven by Gas Engine

A new close coupled gas engine driven "Shield Arc" welder of 300 ampere, 40 volt capacity is announced by The Lincoln Electric Company, Cleveland, Ohio.

The generator is mounted on the engine housing with the drive lined up on hardened steel and driven on cushioned rubber. This method of coupling takes care of any misalignment and reduces vibration.

A uniform generator current permits use of a higher average current with greatly increased welding speed. The capacity of the new welding machine is 60 per cent higher than its predecessor and it is rated at 40 volts. According to the manufacturer, the "Shield Arc" welder has 10 per cent higher efficiency at full loads and still more on overloads, even though it is of much greater capacity.

New Warner Electric Brake

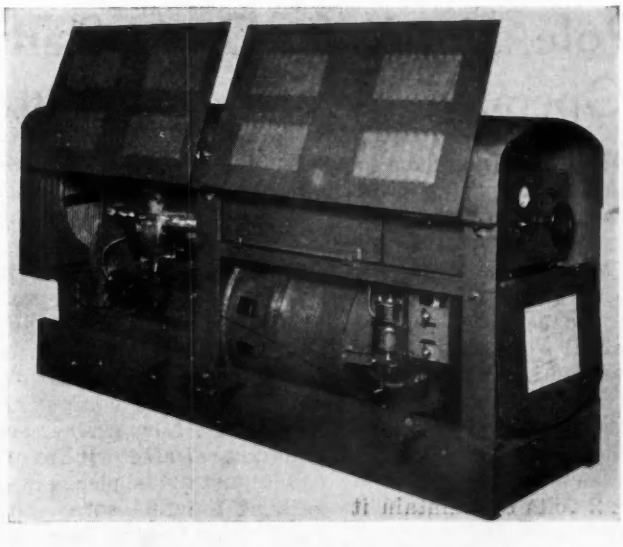
Warner Electric Brake Corporation, Beloit, Wis., announces a new "Mountain-Type" electric brake. Heretofore the Warner brake has been used mostly on trailers, but this new design is said to be equally applicable to trucks. The brake consists of seven parts, exclusive of the brake drum, as follows: The brake backing plate on which the magnet is mounted, the brake band, the magnet, the armature which revolves with the brake drum and is held lightly against the magnet by steel springs, and three springs which return the brake to the "off" position when the electric current is shut off.

The Warner electric brake is applied by means of a pedal, the same as the conventional brake. This pedal connects to a "controller" by means of which current from the truck battery is sent through a magnet on the brake backing plate at each wheel. The more the pedal is depressed the greater the current passing through the magnet.

Inside of each brake drum there is an armature which revolves with it. This armature is slightly pressed against the magnet by flat springs. When electric current flows through the coil of the magnet the latter becomes energized and grips the revolving armature, causing the magnet to start to turn with the armature.

The magnet is connected by lugs to the brake band, and when the magnet starts turning, the lugs expand the brake band, pressing it against the drum. Grabbing and locking are said to be eliminated because there is always a slight slipping action between armature and magnet. When pressure on the brake pedal is released the current flow through the magnet coils ceases and the brake is then released by the springs.

Each brake of the new type has a frictional area of 62 sq. in., as compared with 39 sq. in. in the previous design.



New "Shield Arc" Welder offered by Lincoln Electric Co.

Henschel Regulator Improves Torque at Both Ends of Diesel Speed Range

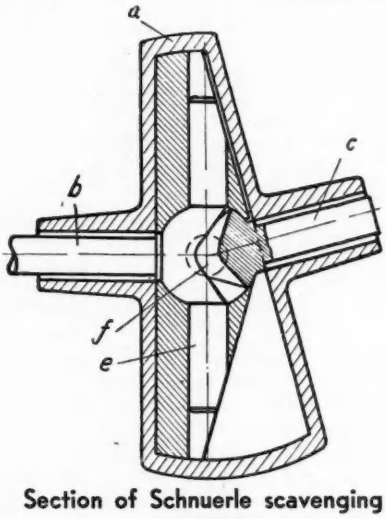
(*Continued from page 115*)

header which returns it to the oil supply chamber of the pump.

One advantage of this system is that it increases the engine torque when starting and when slowly ascending steep grades.

Schnuerle Blower Designed to Scavenge Two-Stroke Diesels

A NEW type of blower, known as the Schnuerle, is used for scavenging the two-stroke automotive Diesel engine exhibited by Krupp at the recent Berlin Show. This engine is fitted with a centrifugal blower in the flywheel for cooling purposes, but for scavenging a centrifugal blower evidently is not so well suited, as its delivery per cycle varies greatly with the speed. A diagrammatic view of the Schnuerle blower, reproduced from ATZ, is shown herewith. Two shafts, *b* and *c*, making an obtuse angle with each other, are mounted in bearings in the end walls of a housing cast of light alloy. Within this housing there is a circular disk whose circumferential surface is in the form of a spherical zone. Each end of the disk consists of two equal plane surfaces inclined about 75 deg. to the axis, the line of intersection of the planes of one end making an angle of 90 deg. with the line of intersection of the planes of the other end. The chambers formed between the wall of the housing and the disk increase and decrease in volume with rotation of the disk, passing through two complete cycles during every revolution. Since the cycles of the two chambers are spaced 90 deg. of crank rotation suction and delivery are constant. The total displacement per revolution is equal to about 110 per cent of the volume of the housing. Inlet and delivery ports are located in the outer wall of the housing.



Section of Schnuerle scavenging pump

It is plain from the drawing that inertia forces do not seriously limit the maximum speed of the blower. The disk turns in the housing with a slight clearance. As it is supported solely by the cross-pins, there are no frictional surfaces which must be lubricated that are exposed to the air current, and the air is said to be delivered to the engine practically free from oil.

New Bosch Throttling Nozzle Reduces Roughness in Diesels

DETONATION or roughness in Diesel engines is said to be materially reduced by a new form of injection nozzle brought out by the Robert Bosch Company of Germany. An accurately calibrated throttling nozzle is placed ahead of the regular injection nozzle. With this nozzle the rate of injection is comparatively low at the start, and it increases as injection proceeds. It is well known that the "hardness" of the combustion depends upon ignition delay and the amount of fuel injected into the cylinder during this period. By keeping down the rate of injection during the delay period the operation of the engine can be smoothened.

This throttling nozzle, moreover, is claimed to make it unnecessary to advance the time of injection by hand as the speed of the engine increases, as the beginning of injection is advanced automatically. In the throttling nozzle the pressure produced by the pump is transformed into velocity. The greater the rate at which the pump moves fuel, the faster the transformation of pressure into velocity, and the earlier the beginning of injection. Under part load, when the amount of fuel injected is less, there is a less rapid growth of pressure and injection begin therefore is naturally retarded. Hand control of injection timing therefore is rendered unnecessary and operation of the automotive Diesel engine is simplified in consequence.

Two-Pole, Hot-Wire Diesel Starting Plugs Operated by Standard Battery

CERTAIN types of Diesel engine require an auxiliary firing means for starting from cold, and hot wire plugs have been largely used for the purpose. A. M. Low, in *The Automobile Engineer*, states that the resistance wires are made of a chrome-nickel alloy about 1/16 in. in diameter. At first it was customary to ground one side of the wire, which necessitated connecting all of the plugs of a multiple-cylinder engine in parallel. As each plug requires about 30 amperes at 2 volts to maintain it at the required operating temperature of 1500-1600 deg. F., quite a large battery cell was required to supply the ignition plugs of a multiple-cylinder engine. This difficulty has now been overcome by making the plugs of the two-pole type (both terminals of the hot wire insulated) and connecting the different plugs in series. Thus the six plugs of a six-cylinder engine are connected across the terminals of a 12-volt battery (the usual truck equipment in England). Mr. Low further states that to assure satisfactory life of the wire coil it must not be placed in the direct path of the fuel spray, although it must be so located that fuel vapors circulate over it constantly when the engine is operating.